# WATER WORKS & SEWERAGE

## A BOBTAIL ISSUE

OCTOBER, being usually the month of damaging frosts, has this year without question lived up to its reputation in the Chicago area where the Gillette magazines are printed.

The "frost" that so effectively "nipped in the bud" this October issue of WATER WORKS & SEWERAGE came very unexpectedly and has successfully kept the machinery of our printers "frozen" since the first of the month. We are alluding to the city-wide strike by the Chicago members of the International Typographical Union which has paralyzed the entire plant of our printers. (Publishers of magazines rarely ever maintain their own printing plants any longer.)

Even at this writing, very late in the month, we are not certain that there will be an October issue of WATER WORKS & SEWERAGE—certainly not unless the strike is settled within the next few days.

However, with the thought that even a bobtailed issue will be better than having no issue at all, we have gone to the trouble and expense of remaking the October layout so that the advertising which was most nearly 100% ready for press, and only those articles which had been completely made up prior to the strike, are being included.

By resorting to this last-minute revision of make-up, it is our hope that the issue can be rushed through to completion immediately after the strike is settled, and will be printed before the month has gone.

We offer our explanation of this bobtailed issue to all concerned—in particular to those of our advertisers whose scheduled copy could not be included. To our readers, who will find so few articles included, we promise to make up for the thinness of this issue by incorporating all of the "frozen" October articles in our November number, in addition to those already scheduled for that issue.

E. SCRANTON GILLETTE
*Publisher*

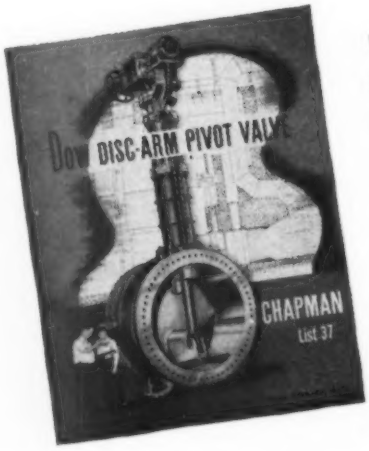
LINN H. ENSLOW
*Editor*

Learn the Advantages of

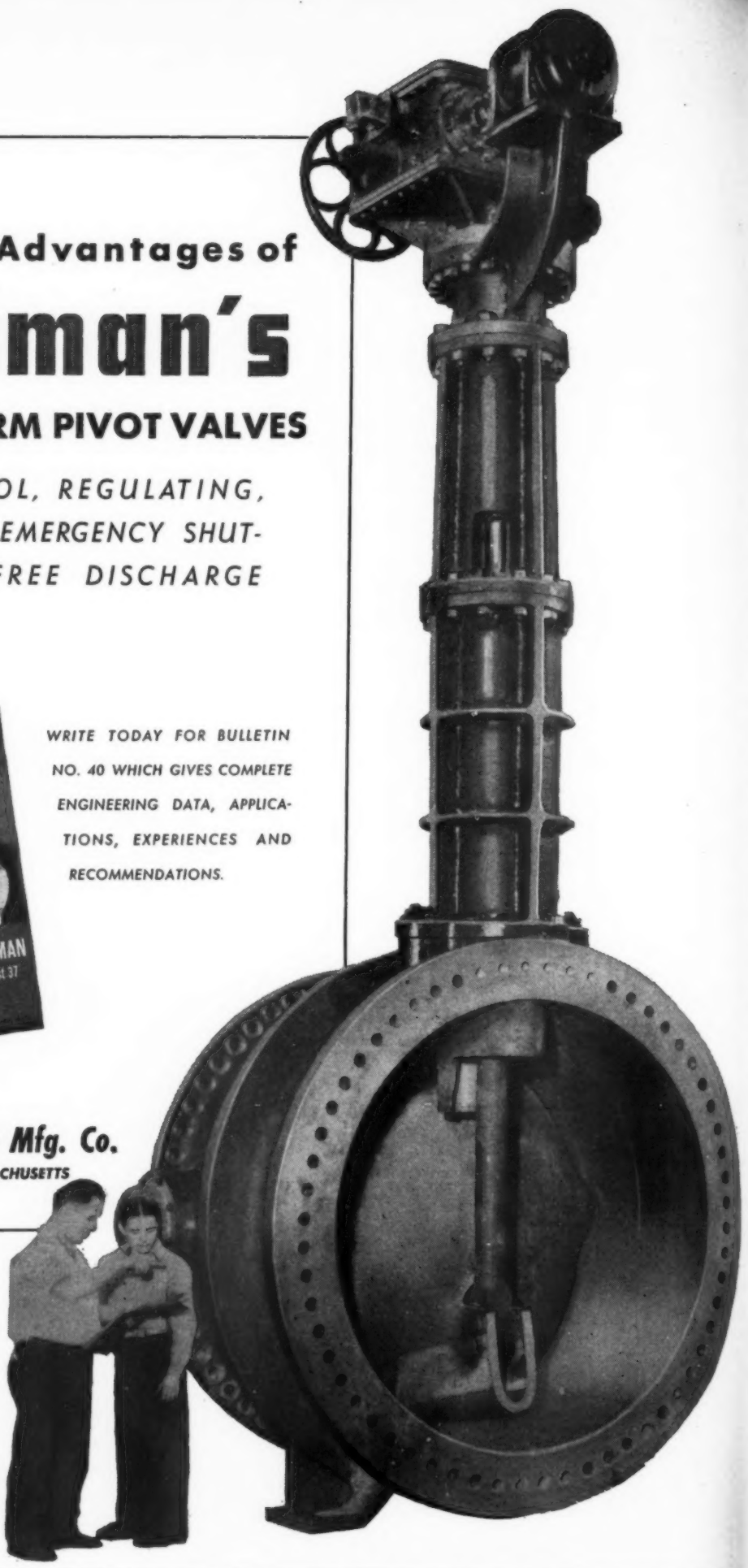
# Chapman's

## DOW DISC-ARM PIVOT VALVES

*FOR CONTROL, REGULATING, THROTTLING, EMERGENCY SHUT-OFF, AND FREE DISCHARGE SERVICE.*




*WRITE TODAY FOR BULLETIN NO. 40 WHICH GIVES COMPLETE ENGINEERING DATA, APPLICATIONS, EXPERIENCES AND RECOMMENDATIONS.*



**The Chapman Valve Mfg. Co.**
*INDIAN ORCHARD, MASSACHUSETTS*



WATER WORKS & SEWERAGE, October, 1945. Volume 92, Number 10. Published monthly by Gillette Publishing Co., 330 South Wells Street, Chicago, Ill. Per copy, 25c. Subscription rate, United States, $2.00 per year; Canada, $2.00 per year; Foreign, $3.00 per year. Entered as Second Class Matter, June 2, 1931, at the Post Office at Chicago, Ill., under act of March 3, 1879.

# There is something new in water meters...

***WATCH FOR ANNOUNCEMENT!***

**PITTSBURGH EQUITABLE METER CO.**

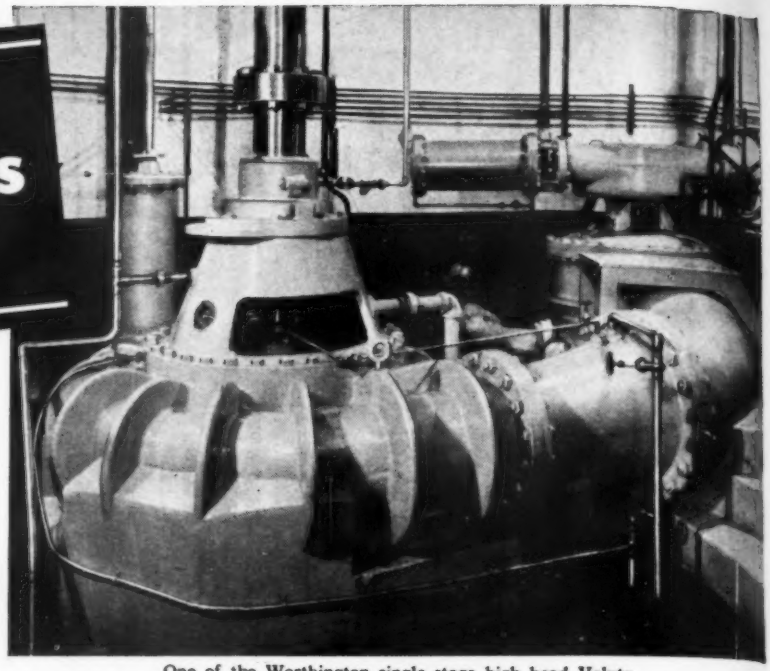
Atlanta Houston **MERCO NORDSTROM VALVE CO.** Los Angeles Boston
Pittsburgh Tulsa Main Offices, PITTSBURGH, PA. Seattle Chicago
Kansas City San Francisco New York

**National Meter Division, Brooklyn, N. Y.**

*water meters*

# GRAND RAPIDS GETS ITS MONEY'S WORTH

## REPEATED SPECIFICATION OF WORTHINGTON EQUIPMENT DEMONSTRATES COMPLETE SATISFACTION



One of the Worthington single stage high head Volute pumps installed at Grand Haven Station, Grand Rapids

*In* **1928,** the city of Grand Rapids, Michigan, installed in its Market Avenue Station eight Worthington Mix-flo Centrifugal Pumps as follows:

**2–20″ Vertical 5600 GPM 18′ Head 40 HP Motor**
**2–20″ Vertical 8400 GPM 18′ Head 50 HP Motor**
**4–36″ Vertical 31,500 GPM 15′ Head 200 HP Motor**

●

*In* **1930,** Worthington furnished additional pumping units to the main station:

**2–20″ Horizontal 15 MGD* 303′ Head 1050 HP Steam Turbine**
**In series. In parallel: 24 MGD at 188′ Head*

●

*Then, in* **1939,** a new source of supply was needed, and Worthington equipment as follows went into the Grand Haven Station:

**1–18″ Vertical *14 MGD 220′ Head 700 HP Syn. Motor**
**1–18″ Vertical *17 MGD 235′ Head 900 HP Syn. Motor**
**1–20″ Vertical *21 MGD 255′ Head 1200 HP Syn. Motor**
**1–24″ Vertical *25 MGD 280′ Head 1500 HP Syn. Motor**
**1–30″ Vertical *31 MGD 325′ Head 2200 HP Syn. Motor**
**All these are single-stage high head volute pumps*

And, at the same time, into a fourth station went:

**1–18″ Horizontal 14 MGD 200′ Head 600 HP Syn. Motor**
**1–20″ Horizontal 21 MGD 210′ Head 900 HP Syn. Motor**
**1–20″ Horizontal 25 MGD 225′ Head 1200 HP Syn. Motor**
**1–20″ Horizontal 31 MGD 235′ Head 1500 HP Syn. Motor**

●

Obviously, Worthington Pumps have been successful in the city of Grand Rapids.

The reasons the city of Grand Rapids and so many manufacturers select Worthington equipment are, chiefly, Worthington's complete line and its top-flight engineering specialists. An idea of the range of equipment from water meters to Diesel engines is given in the strip of products at the left. Worthington engineers—members of a world-wide staff—will help you select the equipment that will prove to you *there's more worth in Worthington. Worthington Pump and Machinery Corporation, Harrison, N. J.*

**MORE JOBS GO TO WORTHINGTON**

*The complete line . . . the top engineering*

- CENTRIFUGAL PUMPS
- DIESEL & GAS & SEWAGE GAS ENGINES, DUAL FUEL ENGINES
- TURBINES & TURBO-GENERATORS
- GAS ENGINE-COMPRESSORS
- STATIONARY COMPRESSORS
- WATER SOFTENING, FILTERING EQUIPMENT
- VERTICAL TURBINE PUMPS
- WATER METERS
- POWER TRANSMISSION EQUIPMENT
- PORTABLE COMPRESSORS & AIR TOOLS

**WORTHINGTON**

# HOW TO IMPROVE Water Pressure

*Two Horton elevated water tanks of 350,000- and 750,000-gal. capacity respectively, installed in high pressure district at Kalamazoo, Mich., to improve water service.*

WHEN Kalamazoo, Mich., was faced with the problem of improving water service for customers in a 3 sq. mi. hilly suburban area, it found the solution in the installation of two Horton elevated storage tanks of 350,000- and 750,000-gal. capacity respectively. The two new tanks, installed in a high pressure district, have their high water levels at the same elevation. Filled from a low pressure system by three automatically-controlled pumps, the operation of the tanks is governed by the level in the 750,000-gal unit. While the depth of the water in the 350,000-gal. tank follows the water level in the larger tank, an altitude valve prevents the 350,000-gal tank from overflowing should a large fire or other emergency create an unusually heavy demand for water and thereby disturb the hydraulic balance.

Mr. Earl E. Norman, Manager of the City Light and Water Utilities Division of Kalamazoo, Mich., discussing the installation of two elevated tanks recently, undoubtedly summed up the thoughts of other municipal officials using Horton storage tanks by saying, "It would be practically impossible to operate without them." For estimated costs of fabrication and erection of Horton elevated storage tanks, write stating capacity required, height to bottom and proposed location.

## CHICAGO BRIDGE & IRON COMPANY

Chicago 4.....2198 McCormick Bldg.
New York 6.....3390-165 Broadway Bldg.
Cleveland 15.....2262 Guildhall Bldg.
Los Angeles 14.....1455 Wm. Fox Bldg.
Birmingham 1.....1586 North 50th Street
Atlanta 3.....2181 Healey Bldg.

Plant in Birmingham, Chicago and Greenville, Pa.

Tulsa 3.....1646 Hunt Bldg.
Houston 1.....5615 Clinton Drive
Philadelphia 3.....1644-1700 Walnut Street Bldg.
Washington 4.....703 Atlantic Bldg.
San Francisco 11.....1283-22 Battery St. Bldg.
Havana.....Edificio Abren

In Canada: Horton Steel Works, Limited, Fort Erie, Ont.

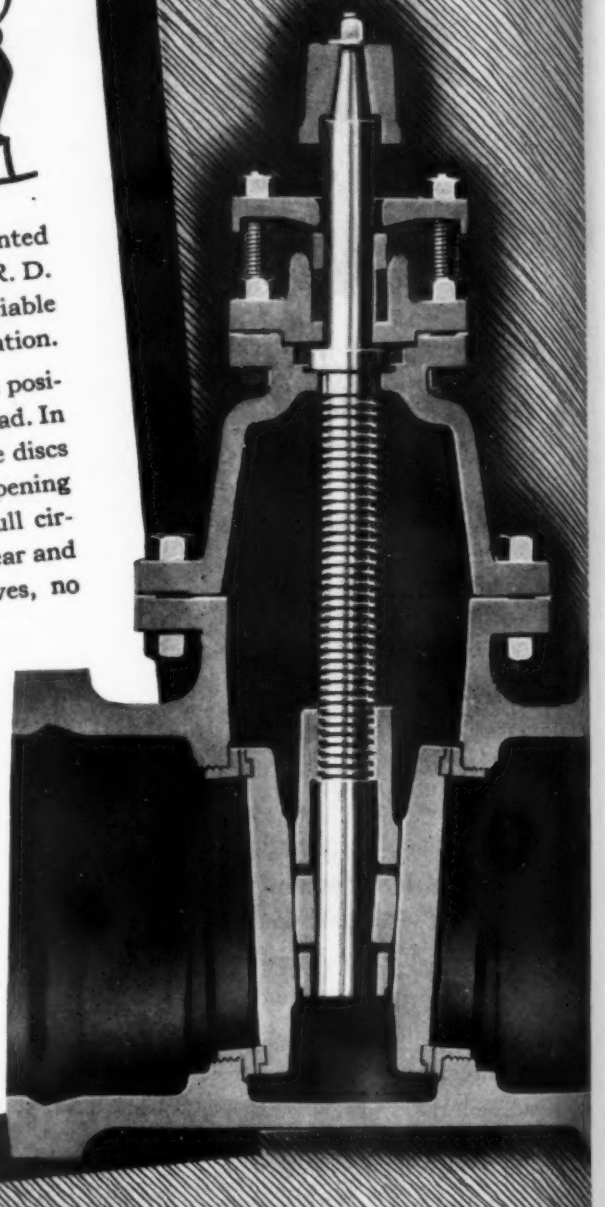
# THE SIMPLEST, MOST RELIABLE VALVE DESIGN

Only three simple parts . . . two bronze-mounted discs and a sturdy, cast-iron spreader . . . the R. D. Wood gate valve offers the simplest, most reliable gate design for long life and sure, easy operation.

As the gates are lowered, the discs reach a position opposite the brass seats before they spread. In opening, the spreader moves first, letting the discs move back, free of the seats, before rising. Opening or closing, they are free to revolve their full circumference. There is no scuffing to cause wear and leaks, no necessity for jamming the valves, no fight to get them open.

To insure tight seating, the spreader applies pressure equally at the center of each disc, so they automatically adjust to seats—even after years of service, and with possible body distortion.

These are some of the reasons why hundreds of American and foreign communities, big and small, pick the R. D. Wood gate valve.



## R. D. WOOD COMPANY

PUBLIC LEDGER BUILDING
INDEPENDENCE SQUARE, PHILADELPHIA 5, PA.

*Established in 1803*

MANUFACTURERS OF MATHEWS HYDRANTS AND SANDSPUN PIPE (CENTRIFUGALLY CAST IN SAND-MOLDS)

# FIRST AID FOR WATER MAINS!

# Perchloron

REG. U. S. PAT. OFF.

## Instantaneous sanitizer for emergency breaks!

The breakage of a water main at any point allows pollution to enter the water supply. Perchloron added to the water safeguards the supply by aiding in the elimination of such pollution.

Water works engineers have found Perchloron a dependable stand-by for just such emergencies because of its quick solubility, greater stability and high chlorine content.

In the water purification field, PERCHLORON is also used to sanitize small water systems, new mains, wells and swimming pools. Its properties include the oxidation of ferrous iron in water, the removal of hydrogen sulphide, the control of most types of algae and the destruction of chlorine susceptible bacteria.

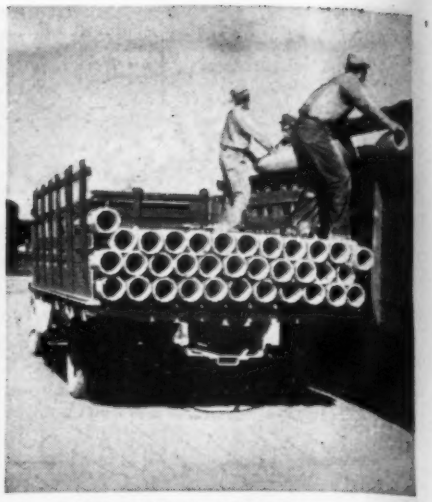
PERCHLORON has been released by the military and is now available. Orders will be filled as promptly as we can meet demands.

## 1. INTERNAL CORROSION

Asbestos-cement Transite Pipe cannot cause "red water." And its initial high flow rate is not affected by that most costly form of internal corrosion—tuberculation.

## 2. MAINTENANCE

In thousands of communities, Transite Pipe —with its advantages of tight joints, corrosion-resistance and immunity to tuberculation—provides low-cost water transportation.



## 3. HANDLING COSTS

Transite's light weight means more footage per truckload . . . easier handling all around. Mechanical handling equipment is not necessary except for the larger sizes.

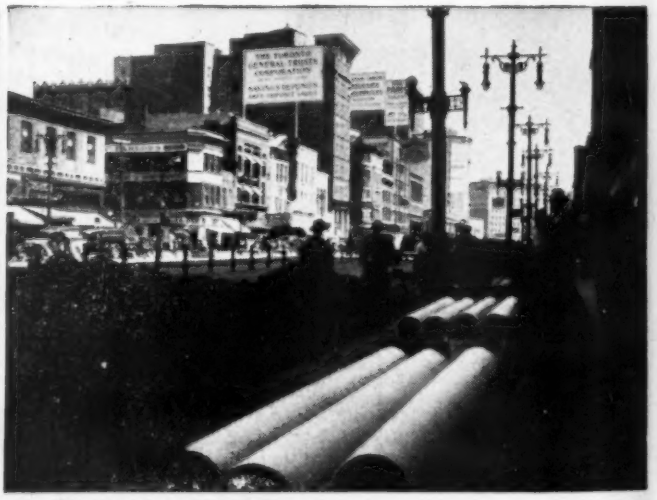
## 7. TRENCHING COSTS

Trenching costs are low with Transite (as indicated above)! No bell holes are required at the joints—width of trenches and disturbance to pavement are kept to a minimum.

# Which of these 12 WATER PIPE PROBLEMS are you faced with?

## 9. SOIL CORROSION

Many a user has found Johns-Manville Transite Pipe the answer to this vexing problem. In numerous installations—many in highly aggressive soils—it has proved stubbornly resistant to corrosion.

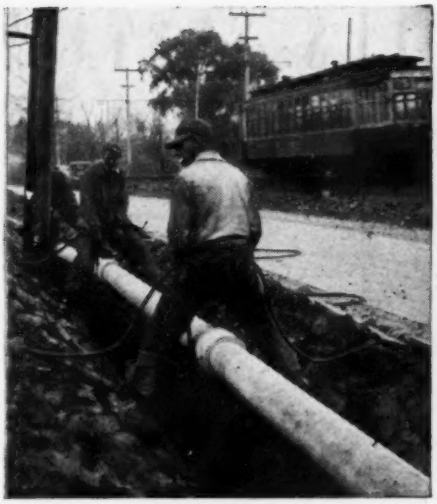


## 10. DELIVERY CAPACITY

Because Transite is non-metallic, its initial high flow coefficient (C=140) is unaffected by tuberculating waters. Progressive reduction of delivery capacity due to tuberculation is never a problem in a Transite water line!

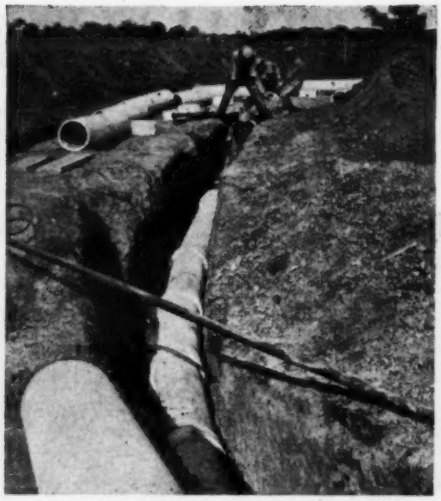
## 4. INSTALLATION COSTS

**Fast assembly, with the Simplex Coupling, keeps installation costs low, minimizes traffic tie-ups. Transite can be tapped and drilled with standard waterworks equipment.**



## 5. ELECTROLYSIS

**Stray electric currents cannot damage this non-metallic pipe. As shown above, it can be laid near street railways and power lines with permanent freedom from electrolysis.**



## 6. CURVES

**Sweeps like that shown above present no problem with Transite Pipe. Flexible Simplex Couplings permit deflections up to 5° at each joint without use of fittings.**


HERE are twelve problems frequently met in water transmission and distribution lines—twelve problems to which Johns-Manville Transite Pipe provides a practical answer. Check the list . . . and find out how this modern asbestos-cement pipe can help you get more efficient, more economical water transportation over the years.

For more complete information, write for Brochure TR-11A. Johns-Manville, 22 East 40th Street, New York 16, N. Y.

JOHNS-MANVILLE JM PRODUCTS

**Johns-Manville**

# TRANSITE PIPE

**An Asbestos Product**

## 8. JOINT LEAKAGE

**Forming a tight yet flexible joint, the Simplex Coupling cuts down costly underground leakage . . . safeguards against washing away of supporting soil and undermining of the pipe.**

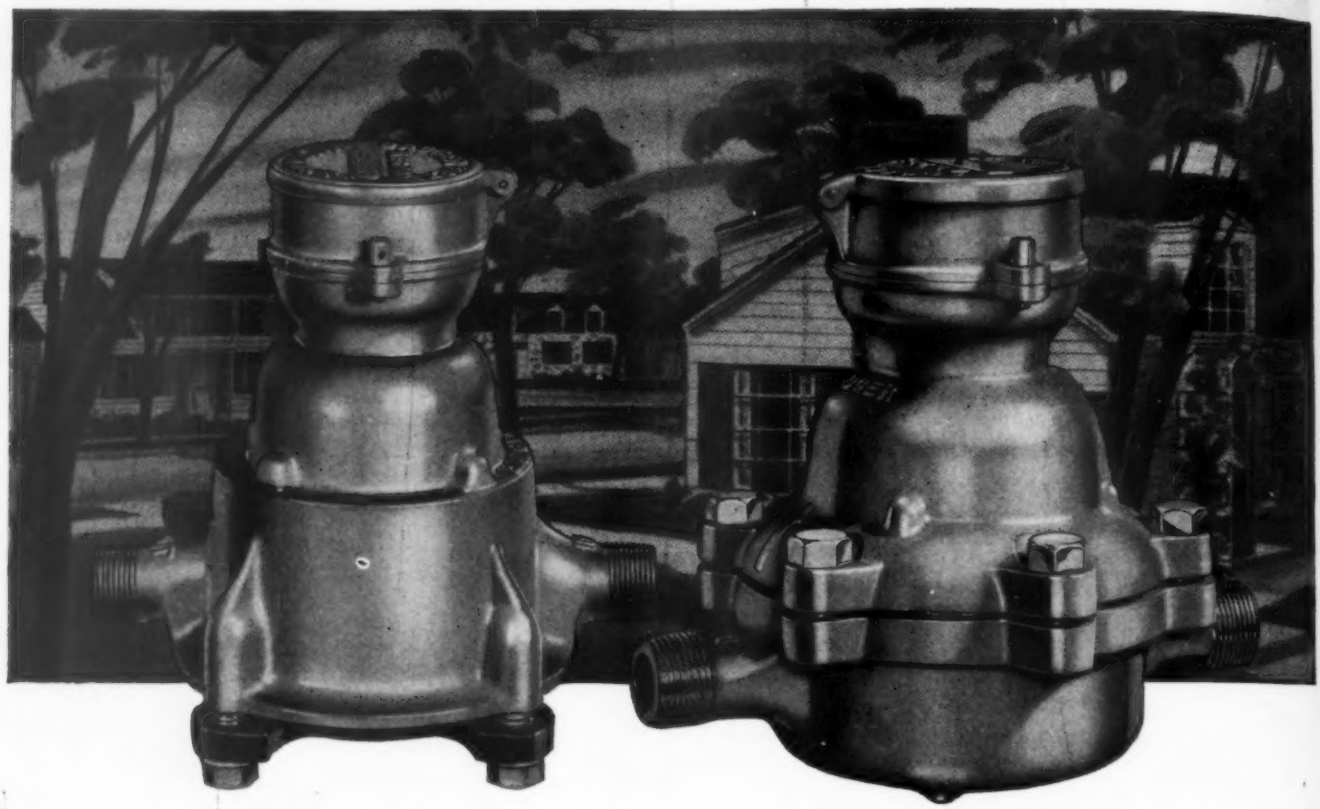
## 11. SOIL STRESSES

**Three factors effectively guard against soil stresses in a Transite water line installation—the high, uniform strength of the pipe itself, its great resistance to corrosion, and the tight, flexible Simplex Couplings.**

## 12. VIBRATION

**Transite's flexible joints effectively absorb the vibration of heavy traffic—an especially important consideration wherever pipe is laid under busy streets and highways, or in the vicinity of railway and streetcar tracks.**

# DURABILITY PLUS SUSTAINED ACCURACY FAR BEYOND NORMAL EXPECTANCY!



FOR forty years Badger has built water meters that faithfully measure every fractional cubic foot of water, from the smallest trickle to maximum capacity flow.

Today, under wartime stress, Badger Water Meters are helping water works men to serve their communities and Our Nation — and to maintain accurate metering at commendably low cost.

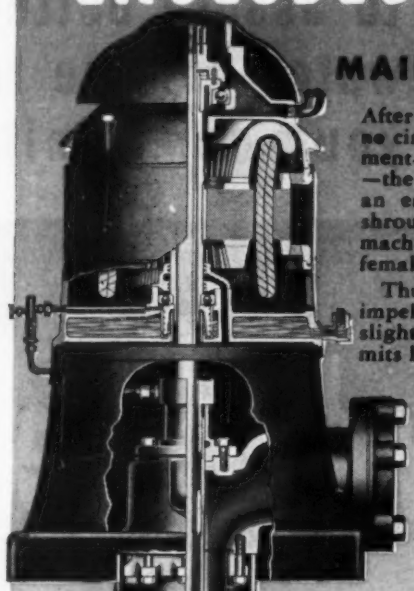
In your postwar planning, bear in mind Badger Meter's record for sustained accuracy and durability far beyond normal expectancy.

**BADGER METER MANUFACTURING CO., MILWAUKEE, WIS.**

*Branch Offices in:* New York City • Chicago, Ill. • Waco, Texas • Portland, Ore. • Salt Lake City, Utah
Seattle, Wash. • Cincinnati, Ohio • Kansas City, Mo. • Tampa, Fla. • Savannah, Ga.
Los Angeles, Cal. • Philadelphia, Pa. • Denver, Colo. • Worcester, Mass.

WHY COOK

# ENCLOSED IMPELLERS *assure* MAINTAINED EFFICIENCY



After years of toughest service there can be no circulation loss or leakage due to adjustment of enclosed Cook impellers. The reason—the Cook enclosed impeller has a skirt and an end seal cast integral with the lower shroud of the impeller. These surfaces are machined to close tolerances to mate with female surfaces machined in the bowl.

Thus the water flows through the Cook impeller, *not between it and the bowl* where slightest misadjustment of the impeller permits leakage and sacrifices efficiency.

Any impeller *designed without a skirt* requires a delicate micrometer adjustment because the impeller vane must mate with the surface in the bowl within thousandths of an inch, and no wear can be compensated for, because any further adjustment *will not correct the wear* which is not concentric with the impeller rotation.

Each Cook Enclosed Impeller is mathematically designed and hand finished to give *maximum* upward *lift* to the water column. Streamlined passages through the bowl minimize friction and turbulence, *deliver greater gallonage at head.*

In every last detail Cook Turbine Pumps are a rare combination of sound design and excellent material, produced with genuine pride in precision workmanship. Yet with all their advantages, *Cook Deep Well Turbine Pumps cost no more than the ordinary kind!*

Note how Cook Enclosed Impeller provides leakproof, fully enclosed water passages, rotating as a single unit.

In the field a simple adjustment of the Cook Head Shaft Nut raises the impeller in scale graduations, so that a seal is provided between the skirt and the bowl. For skirt wear the impeller can be lowered so that the end seal can compensate for wear.

Write for literature and name of nearest dealer.

**A. D. COOK, INC.**

DEEP WELL & INDUSTRIAL TURBINE PUMP DIVISION

Lawrenceburg, Indiana

# Are you TAKING STEPS NOW

**to assure better water service for your community?**

# Elevated Steel Tanks

## by PITTSBURGH-DES MOINES

Now, the previous analysis of your local water storage requirements should be studied, reviewed and re-checked—so that, with construction again possible, your community will benefit by immediate readiness to proceed. Use the experience and facilities of Pittsburgh-Des Moines—without obligation!

**PITTSBURGH · DES MOINES STEEL CO.**

PITTSBURGH, PA., 3412 NEVILLE ISLAND—DES MOINES, IOWA, 913 TUTTLE STREET

NEW YORK, ROOM 915, 270 BROADWAY · CHICAGO, 1216 FIRST NATIONAL BANK BUILDING

DALLAS, 1217 PRAETORIAN BUILDING · SAN FRANCISCO, 619 RIALTO BUILDING

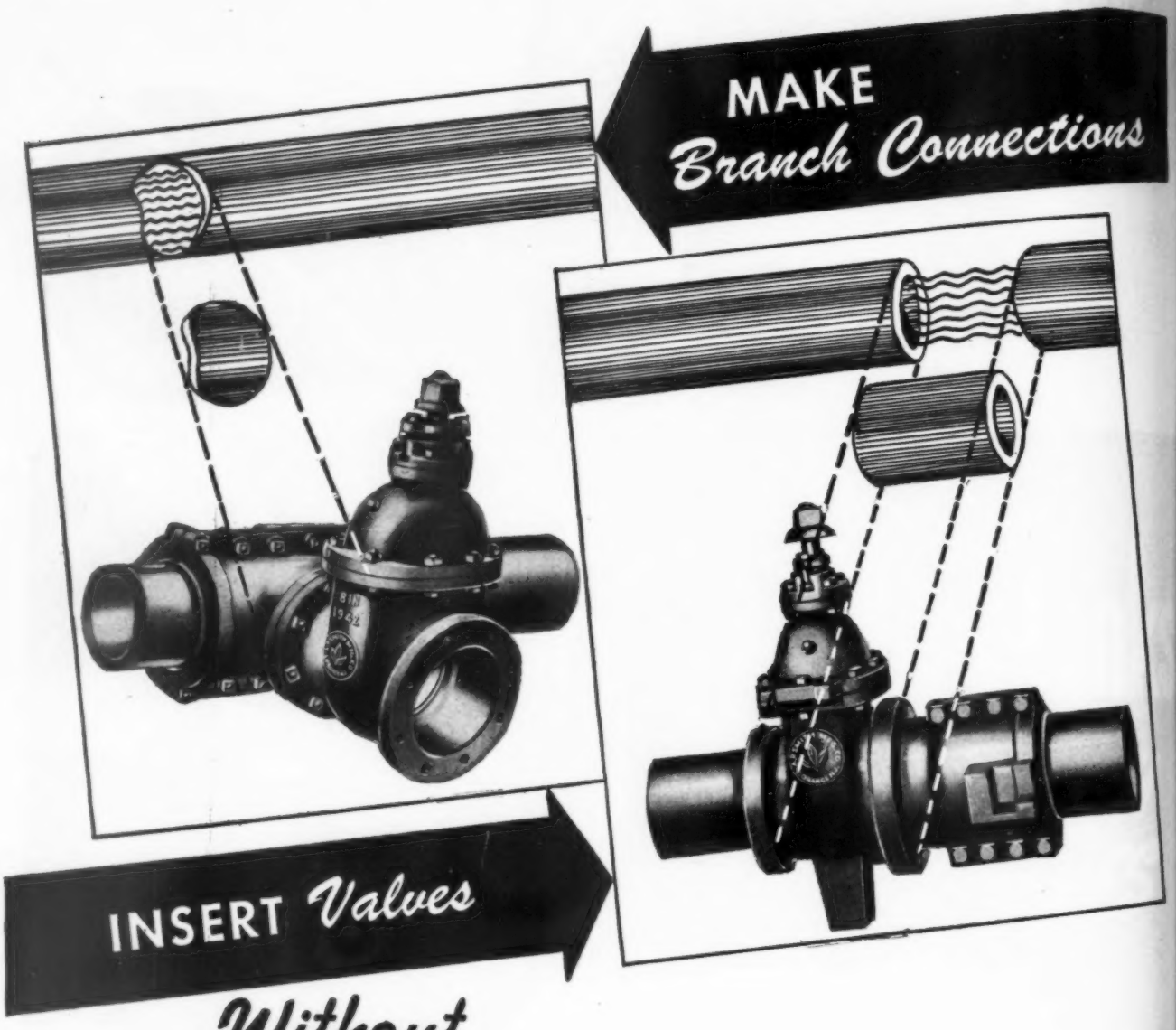
SEATTLE, 520 FIRST AVENUE, SOUTH

*Drawn by Dean Cornwell*

# U.S. cast iron PIPE

U. S. PIPE & FOUNDRY CO.
General Offices: Burlington, N. J.
*Plants and Sales Offices throughout the U. S. A.*

**If you need cast iron pipe now, or later, remember that our pipe foundries do not have to be reconverted, although current production is somewhat modified by limited manpower—that the combined facilities of our several plants represent the largest production capacity in the cast iron pipe industry—and that we can ship from plants and storage yards strategically located in various parts of the country. In the most commonly used sizes, U. S. cast iron pipe and fittings are readily available.**




*Without Interrupting the Flow!*

The making of branch connections or the insertion of gate valves need in no way interfere with service. SMITH products and equipment makes it possible to do either job under full pressure on practically any kind or size of pipe.

**SMITH TAPPING MACHINES,** in a full range of sizes for use with Smith Tapping Sleeves and Valves are available for purchase or rental. These machines permit the connection of branch lines 2" to 42" to any size of main, without interrupting the service. Machines can be hand or air motor operated.

**SMITH INSERTING MACHINES,** make it possible to insert gate valves from 4" to 36" into existing main lines without shutting down the line or interrupting the service.

**Information on these products and machines can be had by writing for catalog 42-M.**

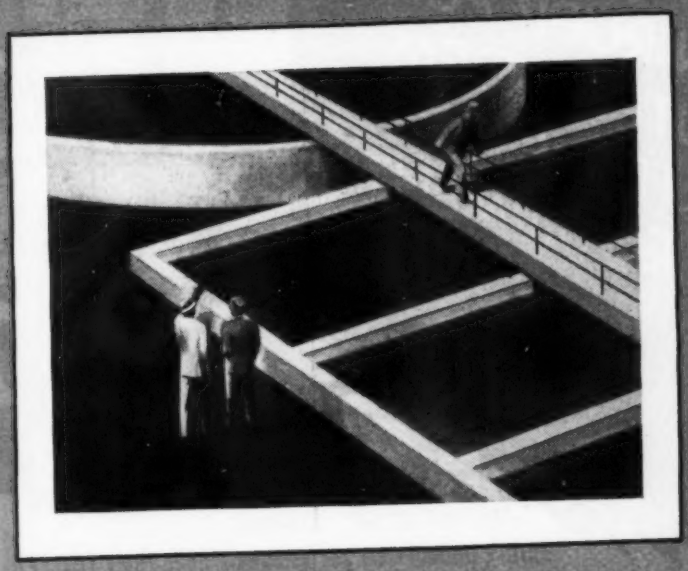
FIRE HYDRANTS
GATE VALVES
CHECK VALVES
INSERTING VALVES
TAPPING SLEEVES AND VALVES
WATER SERVICE BRASS GOODS

THE A. P. SMITH MFG. CO.

EAST ORANGE, NEW JERSEY

FLOOR STANDS
INDICATOR POSTS
TAPPING MACHINES
INSERTING MACHINES
PIPE CUTTING MACHINES
CORPORATION TAPPING MACHINES

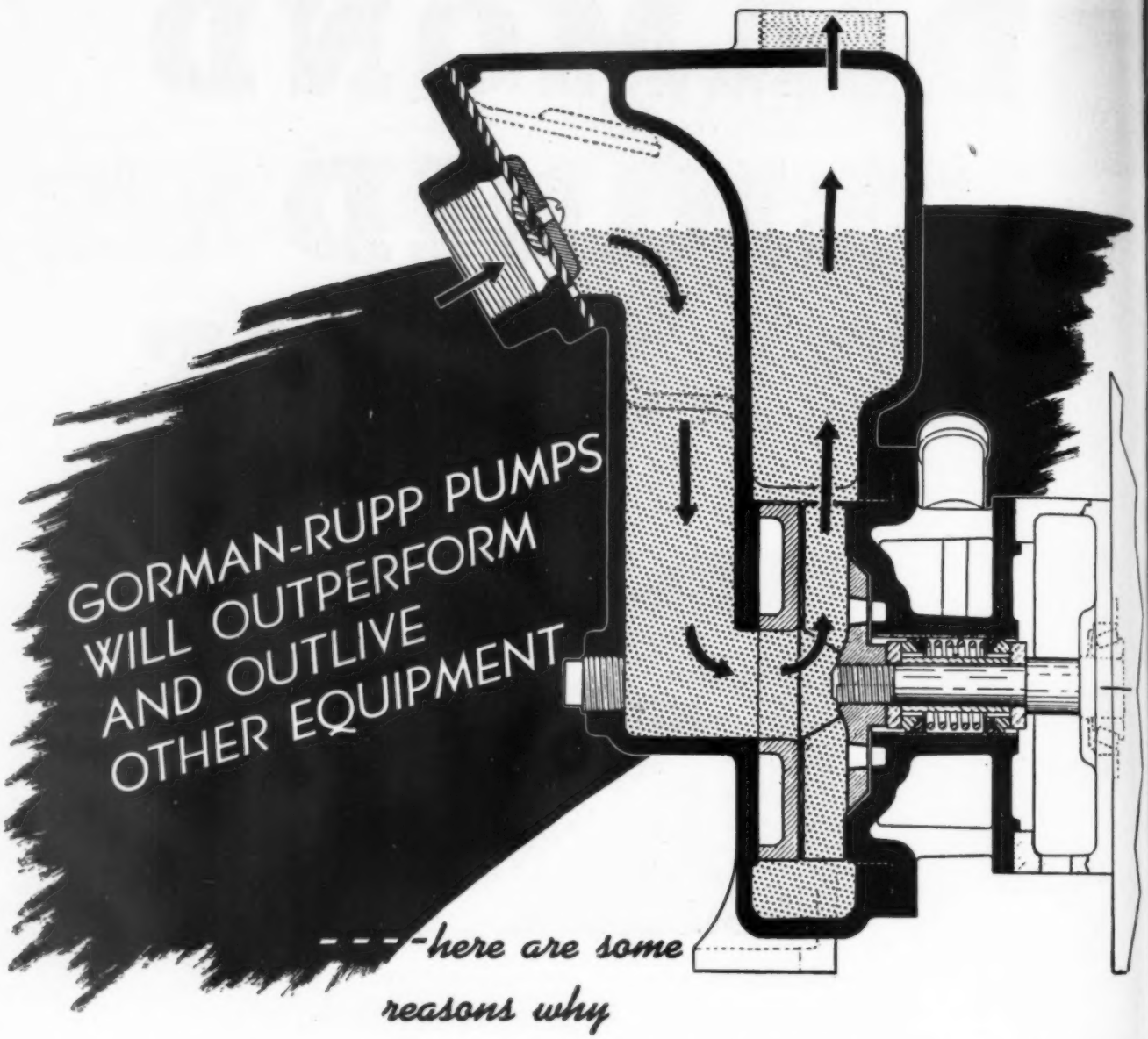
# DIAMOND LIQUID CHLORINE



**The standard, modern and most effective method of treating sewage. Available in single unit cars, multi-unit tank cars and cylinders to meet your specific needs.**

**Diamond Alkali Co.** Pittsburgh, Pa., and Everywhere

ALKALI




*----here are some reasons why*

You can't get the real story of a Gorman-Rupp pump from looking at the outside. It's the simplicity and good design inside that makes this the most efficient, trouble-free pump you can get. *There are no by-passes, no pipes, no valves – nothing to do in priming but start the motor and you start the water. Since such makeshifts rob a pump of as much as 30 per cent of its running capacity, the greater priming simplicity of Gorman-Rupp pumps pays off in more work for less fuel and power.

*Gorman-Rupp pumps are streamlined inside where streamlining counts! Smooth surfaces, no traps and a design that flows with the water adds another big factor to efficiency and prevents clogging. These pumps will handle any muck or solids that will pass the intake and clear them out of the pump body.

*The G-R impeller operates at motor speed, without reduction gears – another source of wear, trouble and maintenance eliminated. This impeller is the only moving part and rotates on high grade roller bearings.

*Every part of a Gorman-Rupp pump has long wear built into it, and every wearing part is replaceable without tearing the pump apart. This maintenance can be done by an unskilled man with common tools.

These are a few reasons why Gorman-Rupp self-priming centrifugal pumps will out-perform and outlive any other comparable equipment. Write for further detailed information.

**THE GORMAN-RUPP COMPANY**

GORMAN-RUPP PUMPS — UNSURPASSED FOR PUMPING FAST

327 BOWMAN STREET • MANSFIELD, OHIO

# *The* ACCELO-FILTER *System*

## RECIRCULATES

trickling filter effluent directly back to the filter inlet.

This ***Direct Recirculation*** brings these advantages and benefits to sewage plant operation and design–

**(1) An Increased Biological Filter Efficiency**
Direct return from filter effluent to filter influent keeps the aerobic organisms in the most favorable environment conducive to maximum bacterial development.

**(2) No Clogging — No Sloughing — No Ponding**
The continuous flushing action prevents excessive accumulations from developing in the interstices of the filter medium.

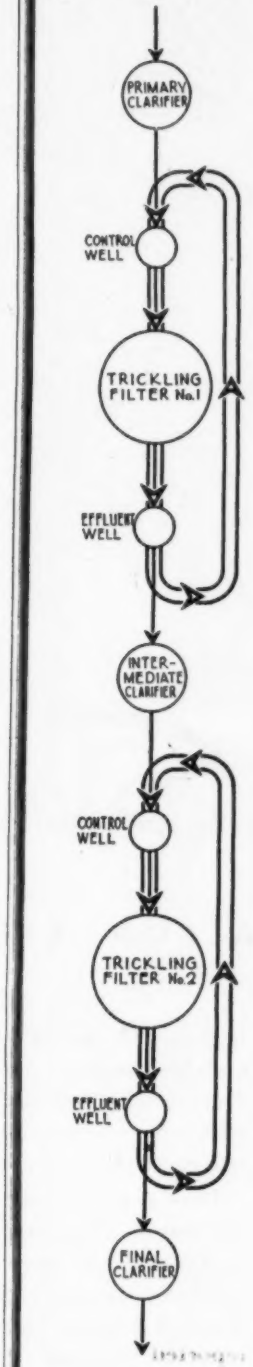
**(3) Odor Nuisance Eliminated or Greatly Reduced**
The continuous flushing action of direct recirculation removes biological gel before decomposition sets in.

**(4) Decreased Opportunity for Psychoda Fly Breeding**
The continuous uniform dosing of direct recirculation keeps the surfaces of the filter medium wet thereby maintaining an environment unfavorable to the breeding of the psychoda fly.

**(5) Increased Capacity for Overloaded Filters**
Direct recirculation makes higher dosing rates possible thereby giving increased capacity to over-loaded existing conventional filters.

**(6) Smaller Filters for Newly Designed Plants**
Inclusion of the Accelo-Filter system in the design of new treatment plants permits the use of smaller filter units because of the higher dosing rates employed.

**(7) No Increase in Size of Sedimentation Tanks**
An exclusive feature of the Accelo-Filter System is that its inclusion in a plant layout does not necessitate the use of larger sedimentation tanks since none of the recirculated material reaches either the primary or final clarifiers.




***Ask for Bulletin 2415***

INFILCO

**INFILCO**
INCORPORATED
**325 W. 25th PLACE, CHICAGO 16, ILLINOIS**

# ...Skylights

## OF ALCOA ALUMINUM ARE GOOD

He says, "From 1926 to 1941, we used approximately ¾-million pounds of aluminum in connection with our skylights . . . In every case where we recommended the use of aluminum, our customers have been highly pleased".

Here's real evidence of durability. Their aluminum skylights have been subjected to every type of exposure—extremes of weather outdoors, dampness and, often, fumes indoors. Yet not a single case of failure has ever been reported to them.

With such long life, you are spared much of the inconvenience and high cost of maintenance. Ask your supplier about skylights of Alcoa Aluminum. ALUMINUM COMPANY OF AMERICA, 1955 Gulf Bldg., Pittsburgh 19, Pa.

**ALCOA** FIRST IN ALUMINUM

ALCOA ALUMINUM

*Many materials and processes contribute to the making of a smart white fabric... pulp and paper... an ingot of pure metal... potable water... or an insecticide. But to all of these... and many more... "$Cl_2$" is an important common denominator. In producing liquid chlorine and the other basic chemicals of its manufacture to the highest standard of purity and uniformity, Niagara is ever mindful of its responsibility as a leading and pioneering factor in America's great electro-chemical industry.*

*An Essential Part of America's Great Chemical Enterprise*

# Niagara Alkali Company

CAUSTIC POTASH • CAUSTIC SODA • PARADICHLOROBENZENE • CARBONATE OF POTASH • LIQUID CHLORINE • NIATHAL

60 EAST 42nd STREET • NEW YORK 17, N. Y.

# TEN REQUIREMENTS
## FOR UNDERGROUND MAINS
## *under normal conditions*

**Long Life:** In evaluating bids, the useful life of cast iron pipe is figured at 100 years minimum.

**Carrying Capacity:** The carrying capacity of standard tar-coated cast iron pipe remains practically unimpaired for centuries. For the certain areas where tuberculating water is encountered, cement-lined cast iron pipe is available. Under such conditions, no other material offers the combined long life and sustained carrying capacity of cement-lined cast iron pipe.

**Tight Joints:** For *ordinary* pressures, cast iron bell-and-spigot pipe—for *high* pressures, cast iron mechanical joint pipe—are known to be leak-proof.

**Tensile Strength:** When tested under hydrostatic pressure to destruction, the ultimate tensile strength of cast iron pipe is a minimum of 11,000 p.s.i. for pit cast pipe and a minimum of 18,000 p.s.i. for cast iron pipe made by other methods.

**Beam Strength:** Under beam stress tests, 10 ft. span, standard 6″ cast iron pipe sustains a load of 15,000 pounds and bends approximately one inch before breaking.

**Toughness:** Under hydrostatic pressure and the impact of a 50 lb. hammer, standard 6″ cast iron pipe does not crack until the hammer is dropped four feet.

**Internal Pressure:** An average of many internal hydrostatic pressure tests on standard 6″ cast iron pipe shows this pipe withstands more than 2500 pounds pressure per square inch.

**External Load:** In regulation ring compression tests, standard 6″ cast iron pipe withstands a crushing weight of more than 14,000 lbs. per foot.

**Imperviousness:** The walls of cast iron pipe are impervious to leakage, seepage, or sweating of water, gas or chemicals under internal pressure tests.

**Tapping:** Cast iron pipe can be tapped cleanly with strong, tough threads, losing little in structural strength.

**Other pipe materials meet some of these requirements but only cast iron pipe meets them all.**

Whether a pipe material is able to fulfill these requirements is a matter of experience rather than prediction. A page of history is worth a volume of sales claims. History proves that cast iron pipe has been meeting these ten requirements for generations.

Cast Iron Pipe Research Association, Thomas F. Wolfe, Research Engineer, Peoples Gas Building, Chicago 3.

# CAST IRON PIPE
## *SERVES FOR CENTURIES*

CAST IRON

# Save Time
## ON PIPE TAPPING

**Do it the power way. Use an electric drill operated by a Homelite Portable Gasoline-Engine-Driven Generator to run your tapping machine. It's much easier than the old-fashioned hand method. Faster, too. You can drill and tap a main in less time, for less cost and with less trouble than any other way.**

The best way to see the performance that you get with Homelite Portable Generators, Pumps and Blowers is to have a demonstration given right on an actual job. If you want a free demonstration without obligation, simply write to us. We'll have our nearest representative get in touch with you.

# Homelite Corporation

*Portable* PUMPS • GENERATORS • BLOWERS

PORT CHESTER, NEW YORK

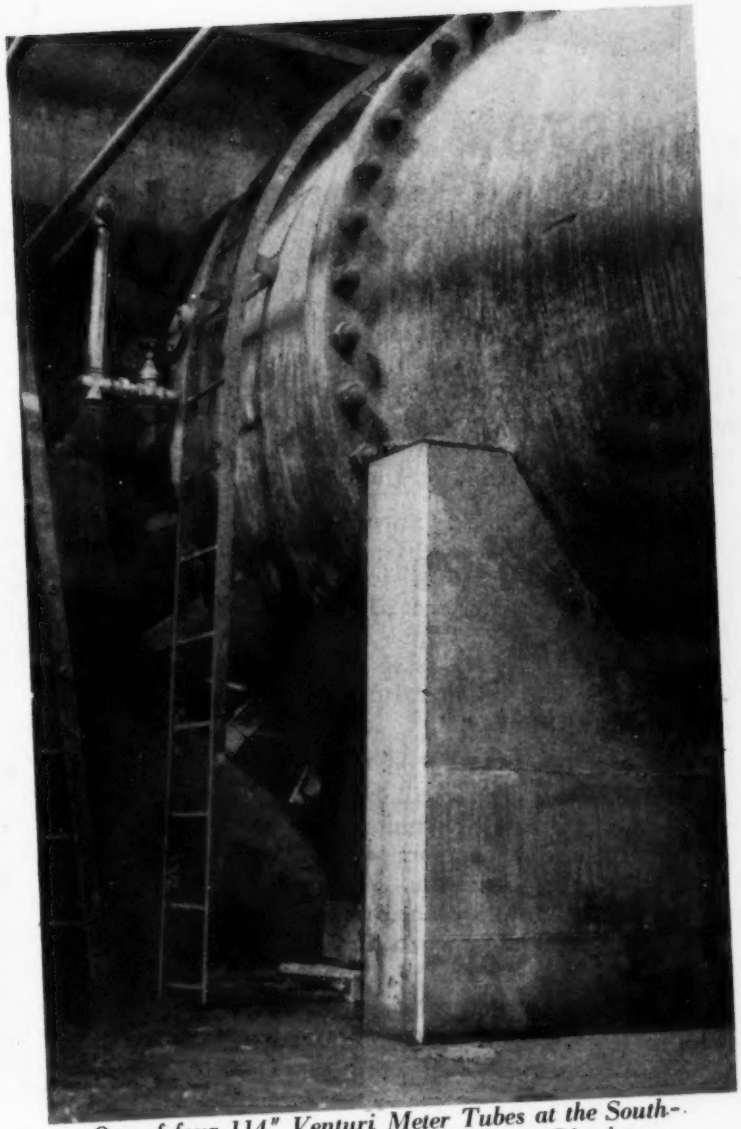
# BUILDERS Venturi Tubes

## CONSISTENT PERFORMANCE REGARDLESS OF SIZE

A sea-going whale could easily swim through the gigantic Venturi Tubes measuring incoming raw sewage at the world's largest sewage plant in Chicago.

BUILDERS Venturi Tubes in a wide range of capacities—from a billion gallons a day down to a few hundred gallons an hour—have been metering water and sewage with the same high accuracy for decades. Every BUILDERS Venturi Tube, large or small, has the same clear passageway,—entirely unobstructed by internal mechanism, the same low loss of head, the same enduring accuracy.

Builders Type M Instrument, operated by the Venturi Tube, provides an accurate record not only of total flow but also indicates and charts the momentary rate for future reference. For new Bulletin 293C with complete information on Venturi Meters, address Builders-Providence, Inc., (Division of Builders Iron Foundry), 10 Codding Street, Providence 1, R. I.



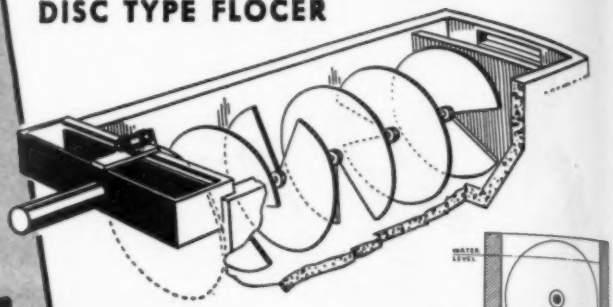
*One of four 114" Venturi Meter Tubes at the Southwest Plant of the Chicago Sanitary District.*

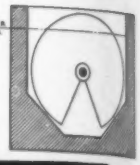
*Sincerely*

**BUILDERS-PROVIDENCE**

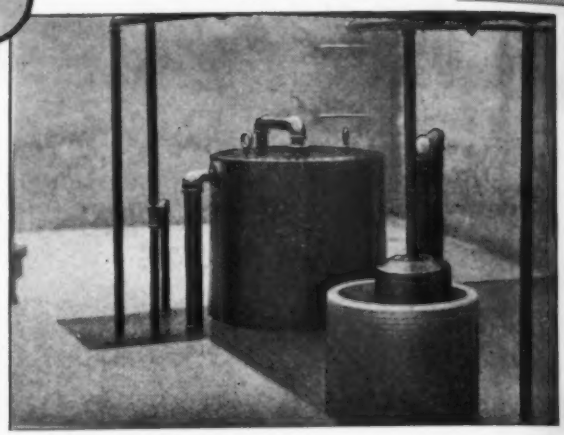
# CARTER SEWAGE TREATMENT EQUIPMENT

CARTER
DISC TYPE FLOCER





CROSS SECTION OF
ONE CONTROLLER



ALTERNATING SIPHONS
For high degree secondary treatment . . . Carter Siphons alternately dosing sand filter beds.

## • CUSTOM BUILT TO PRECISION STANDARDS

CARTER "custom built" mechanical equipment for both water purification and sewage treatment carries imagination tempered with over 45 years' experience into every installation. Our policy of careful investigation, sound engineering and thorough laboratory and field testing must prove every new CARTER development before it appears on the market.

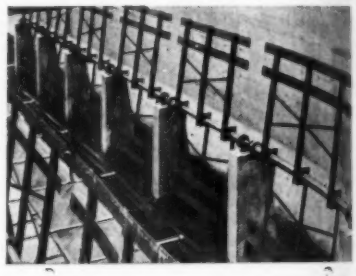
The CARTER nameplate attached to our equipment, is your guarantee that that mechanism has been built to precision standards, fabricated from the finest material, and then carefully factory tested under actual duplicated field conditions. CARTER sewage equipment with a minimum of operation, assures you the maximum in results.

Complete information on CARTER mechanisms illustrated above will be gladly furnished without obligation. Technical assistance to our customers as to mechanism sizes, types or applications is always available. Whether you're planning to revise an old plant or design a new one, there's a CARTER unit to fit your installation.

*Write for further information.*

**PADDLE TYPE AERATORS**

For positive mixing, elimination of short circuiting and a minimum of power consumption, CARTER mixing equipment in many installations has paid for itself thru greater savings in chemicals and increased overall plant efficiency.



**• OTHER CARTER PRODUCTS •**

**Diaphragm pumps • Slow mixers Flash mixers • Digesters • Clarifiers Sludge Mixers • Rotary Distributors • Self Priming Centrifugal Pumps • Contractors pumps**

## RALPH B. CARTER COMPANY

Main Office: HACKENSACK, N. J. New York Office: 53 PARK PL., NEW YORK 7, N.Y.

***. . . and parts like these:*** Coarse and Fine Screens, Float Chambers, Swing Gates, Built-up Sluice Gates, Coarse Bar Rack Aprons, Effluent Weirs and Scum Weirs, Structural Scum Baffle Brackets, Troughs, Screen Hoppers, Orifices, Baskets, Pipe, Ladders, Float Gage Chains, Valve Springs, Guides, Walkways, Electrical Conduit, Flashboard Supports, Flush Box Fittings, Spillway Fittings, Valve Stems.

THE EVERDUR* equipment illustrated, and the additional items listed, have given thoroughly satisfactory service . . . for periods up to 18 years.

The reasons for this record are readily evident: Everdur Copper-Silicon Alloy combines the corrosion resistance of copper with the tensile strength of mild steel. It thus provides trouble-free, economical service under severe conditions of both stress and corrosion.

Equally important from the standpoint of availability, this readily workable and weldable alloy is made in practically all commercial forms. For detailed information, write for Publications E-11 and E-6. 45187

*Reg. U. S. Pat. Off.

ANACONDA

# Everdur Copper-Silicon Alloy

THE AMERICAN BRASS COMPANY—General Offices: Waterbury 88, Connecticut

*Subsidiary of Anaconda Copper Mining Company • In Canada:* ANACONDA AMERICAN BRASS LTD., *New Toronto, Ont.*

**Buy Victory Bonds . . . Help assure World Peace**

# Back to Pre-War Quality

● General Chemical Aluminum Sulfate is back to pre-war quality . . . eliminating the emergency "war grade" product necessary during the critical period of raw material shortages.

Once again American Industry has at its command the superior standard-grade Alum of high strength and low insoluble content for which the Company has always been known. And *today, as in the past, General Chemical filter and paper makers' Alum more than meets Industry's pre-war specifications,* with its quality and purity remaining uniform—lot after lot, shipment after shipment.

This superior product is available in lump, ground, and powdered sizes from conveniently located plants and shipping points throughout the nation. . . . For immediate delivery, phone or write the nearest General Chemical Sales & Technical Service Office listed below.

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GENERAL CHEMICAL COMPANY

FOR AMERICAN INDUSTRY ©

## GENERAL CHEMICAL COMPANY

**40 Rector Street • New York 6, N. Y.**

*Sales and Technical Service Offices:* Atlanta • Baltimore • Boston • Bridgeport (Conn.) Buffalo • Charlotte (N. C.) • Chicago • Cleveland • Denver • Detroit • Houston • Kansas City • Los Angeles • Minneapolis • New York • Philadelphia • Pittsburgh • Providence (R. I.) San Francisco • Seattle • St. Louis • Utica (N. Y.) • Wenatchee & Yakima (Wash.)

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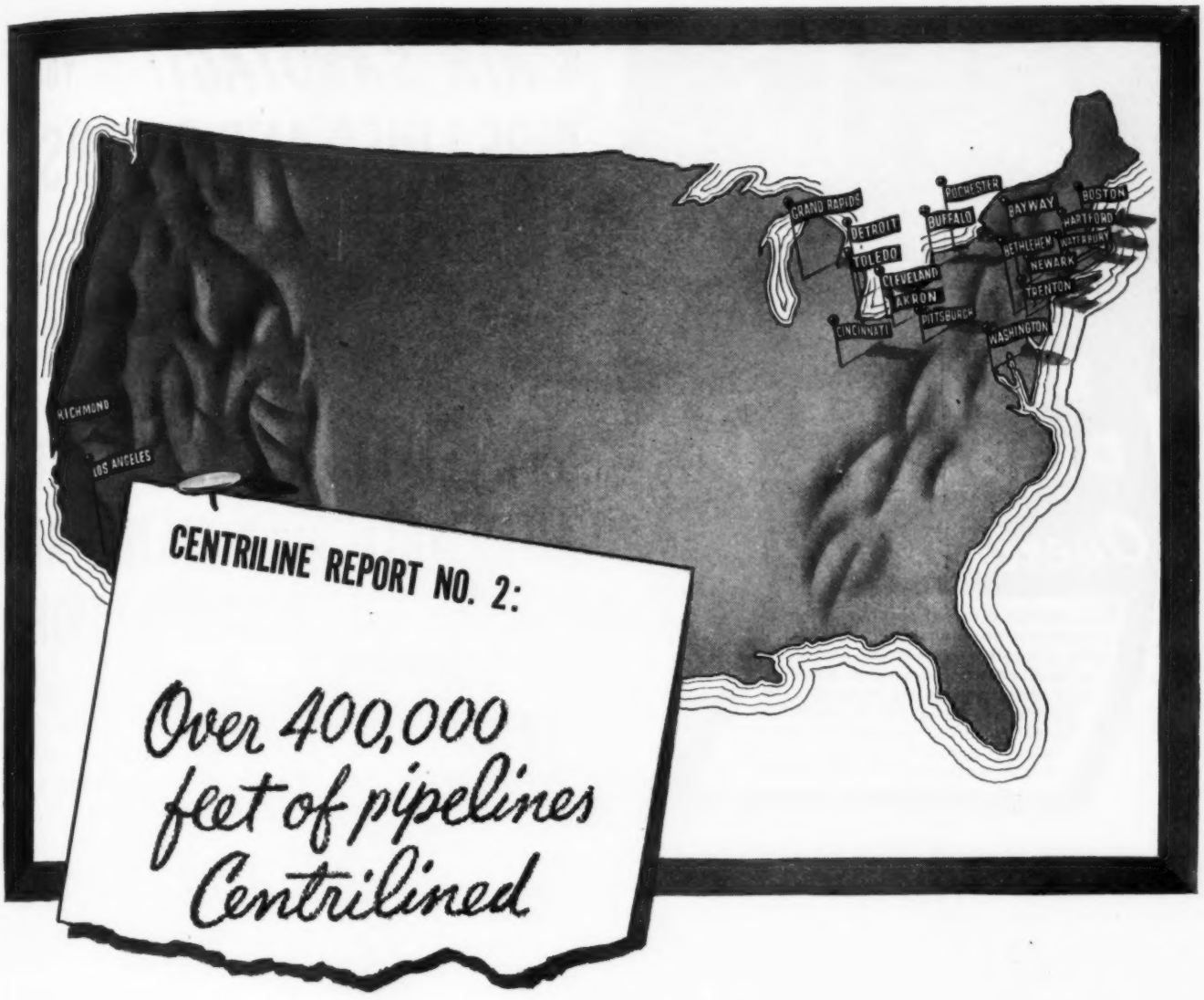


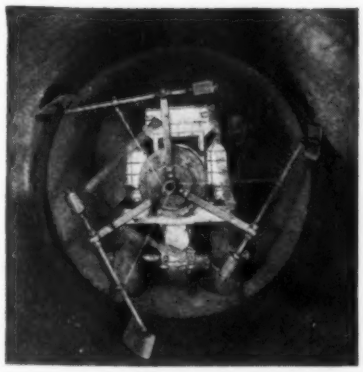

## CENTRILINE REPORT NO. 2:

# *Over 400,000 feet of pipelines Centrilined*

NINETEEN major cities throughout the United States . . . from New York to California . . . now have higher carrying capacity in their important water supply lines—as a result of the Centriline process of reconditioning 29 installations—totaling almost a half-million feet of age-old pipelines.

Through the Centriline method of first cleaning the main and then applying by centrifugal force a thin protective inner lining of cement mortar the original carrying capacity of these important pipelines was restored. Not only was there an increase in the amount of water delivered, but also depreciation and pumping costs were cut to a minimum.

If tuberculation has invaded your water system lines—it's high time to CENTRILINE . . . and eliminate future depreciation costs and pumping expenditures. Wherever your pipeline is situated—whatever its length—if its diameter is 30" or more—Centriline men and Centriline equipment can quickly reach and recondition it.



The Centriline process is a rapid and economical method of reconditioning pipelines. It consists of first cleaning the main, then applying by centrifugal force, a dense cement mortar lining of required thickness, mechanically troweled to a smooth finish. This is done underground, in place.

CENTRILINE PROCESS

## CENTRILINE CORPORATION

148 CEDAR STREET • NEW YORK 6, N. Y.

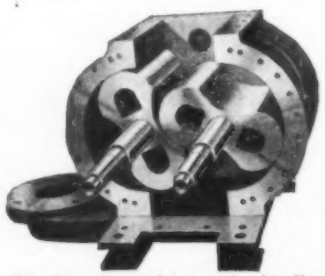
***Restores and Protects Pipe-Line Carrying Capacity***

# SEWAGE DISPOSAL *Overloaded?*

**This sewage disposal plant serves a southern city bursting its seams with a swollen population and expanded industry. Sewage disposal is loaded far beyond the capacities for which it was designed. These POTTSTOWN BLOWERS demonstrated their efficiency under accelerated aeration and activation of the sludge fans.**

Efficient positive displacement with these blowers is accomplished because their precision machining permits exceptionally close tolerances on moving parts. Their efficiency is maintained during long life because there is no actual contact or friction between the impellers themselves—nor between impellers and casing interior. *No wearing parts here!*

With friction eliminated, interior lubrication is unnecessary. Only clean air—uncontaminated by lubrication—is delivered to your filters or diffusers. No valves, springs or other friction parts to wear out or to necessitate repairs. Simplicity of design . . . sturdy construction . . . precision machining—THESE FEATURES eliminate maintenance and adjustments, *even on daily 24-hour service!*



This shows the two interengaging impellers of the Pottstown Blower which rotate in opposite directions. The concave portion of each impeller alternately carries an impulse of clean air from the bottom inlet half around the interior of the casing wall and forces it through the top outlet. At operating speeds these alternate impulses of air merge into a continuous flow.

Write today for our *new* Bulletin.

**ALLEN BILLMYRE COMPANY**
490 Fayette Ave. Mamaroneck N. Y.

**POTTSTOWN**
ROTARY POSITIVE DISPLACEMENT
**BLOWERS**

# IS *AIR SABOTAGING* YOUR PIPE LINES AND PUMPS?

If not removed, air entrained in a liquid or entering the system through leaky joints and pump suctions, may result in serious damage to the pipe line and to the pumping equipment. These air obstructions not only reduce the operating head, but the area of discharge is considerably reduced or entirely cut off.

# SIMPLEX AIR RELEASE VALVES AUTOMATICALLY VENT AIR ACCUMULATIONS

THE Simplex Automatic Air Release Valve is of simple, dependable construction, having but one lever movement which operates a needle valve so designed as to be always tight seating. The valve is operated by a heavy thickness glass ball float, tested to several times the service working pressure. A cast iron shell houses the actuating parts which are of corrosion resisting materials.

Standard Simplex Air Release Valve is for working pressures up to 250 lbs. per square inch. The Type "ARA" valve is similar in design but operates up to 1250 lbs. per square inch. Simplex Air Release Valves are being used extensively on lines and pumps for the release of air in water and sewage lines, oil and gasoline lines, and for industrial process liquids.

Write today for further information on the Simplex Air Release Valve — the automatic watchdog to assure continuous peak flow.

**SIMPLEX VALVE & METER COMPANY**
**6743 Upland Street • Philadelphia, Pennsylvania**

Rectox Cathodic Protection Rectifier in weatherproof cabinet for pole mounting along right of way. Occasional inspection is only maintenance needed.

# how to stop pipeline corrosion

## Rectox rectifiers protect 24" natural gas line from Texas to West Virginia

The vital 24" natural gas pipeline that sprawls 1,265 miles from Texas to West Virginia needs protection from electrolytic corrosion created by certain soil conditions. It gets this protection from Westinghouse Rectox Cathodic Protection Rectifiers.

The trick is to keep the current flowing from the soil to the pipe, since corrosion nearly always occurs where the current leaves the pipe... almost never where the current enters the pipe. The answer is a simple installation of Rectox Rectifiers (see circuit diagram) at intervals of 1 or more miles along the line, depending on local conditions.

Westinghouse Rectox units bring special advantages to this important application. Operation is noiseless and there is no radio interference. Maintenance is low, for there are no moving parts, liquid or chemicals to repair or replace. Efficiency is high.

Rectox Cathodic Protection Rectifiers are built in both indoor and outdoor types, the latter mounted in a weatherproof cabinet for pole mounting along right of way. Your nearest Westinghouse office can give you further information on cathodic protection equipment for pipelines and other underground structures. Ask for Descriptive Bulletin 49-050. Westinghouse Electric Corporation, P. O. Box 868, Pittsburgh 30, Pennsylvania.

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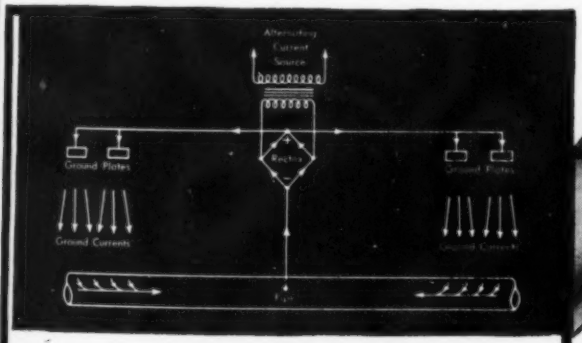



Schematic diagram of installation that eliminates corrosion by keeping pipe negative to soil.

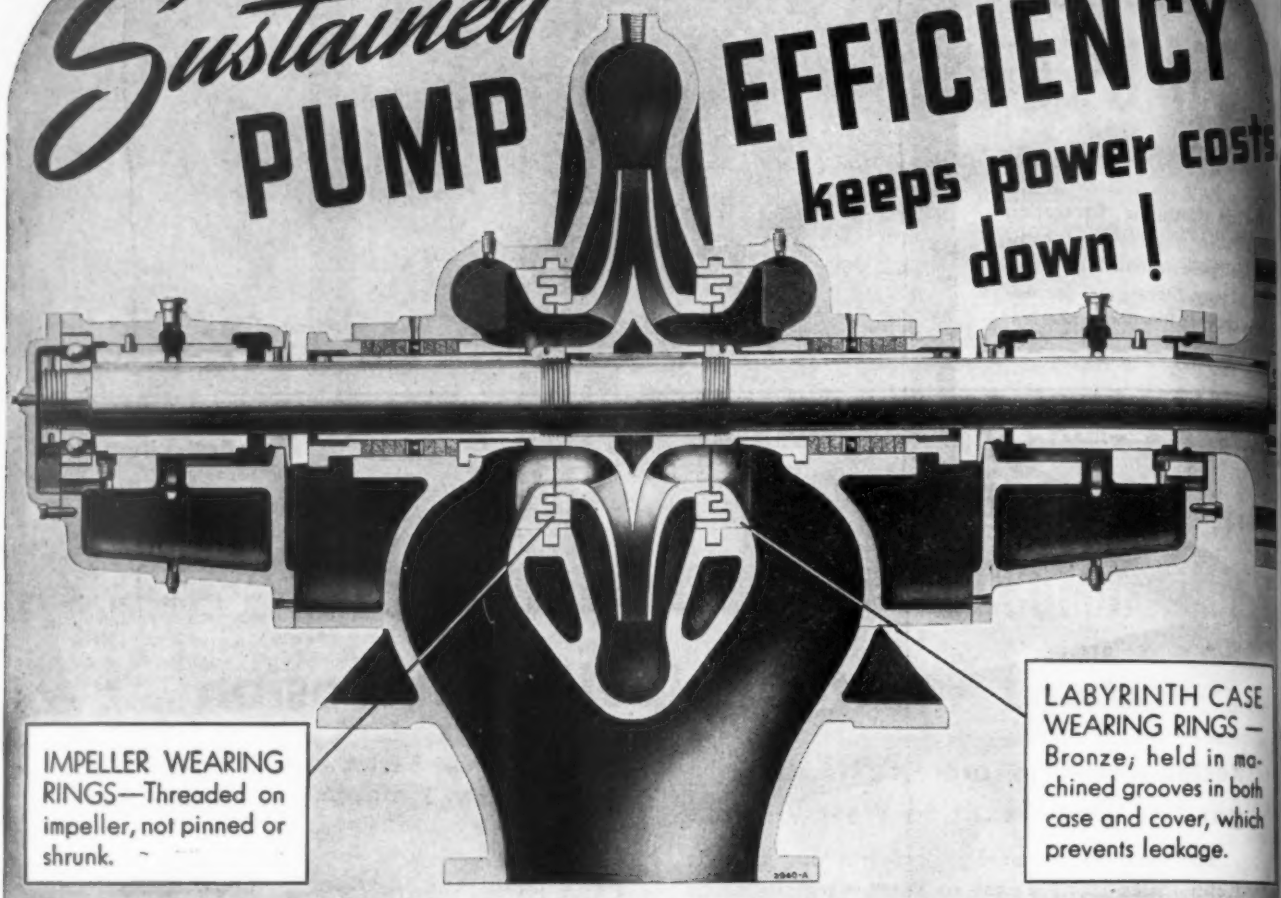
Westinghouse

PLANTS IN 25 CITIES . . . OFFICES EVERYWHERE

Rectox

*Electrical Equipment for Municipal Water Systems*

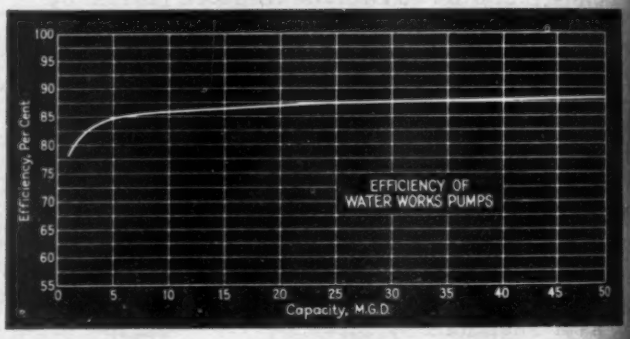
# *Sustained* PUMP EFFICIENCY keeps power costs down!


IMPELLER WEARING RINGS—Threaded on impeller, not pinned or shrunk.
LABYRINTH CASE WEARING RINGS—Bronze, held in machined grooves in both case and cover, which prevents leakage.

Initial high pump efficiency is sometimes obtained by the use of excessively close clearances between wearing rings, but, attained in this way, it is not long maintained, particularly where flat rings are relied upon.

*DE LAVAL LABYRINTH WEARING RINGS* are distinct because, without resort to close clearances, they make possible high pump efficiency, which is maintained over a long interval, as demonstrated, for instance, by two 25 m. g. d. De Laval pumps in the Shawmont Station, Philadelphia.

Unit No. 4 in the acceptance test on January 22, 1927, showed a wire-to-water efficiency of 82.7 per cent and, when tested again on January 20, 1933, an efficiency of 83.9 per cent.



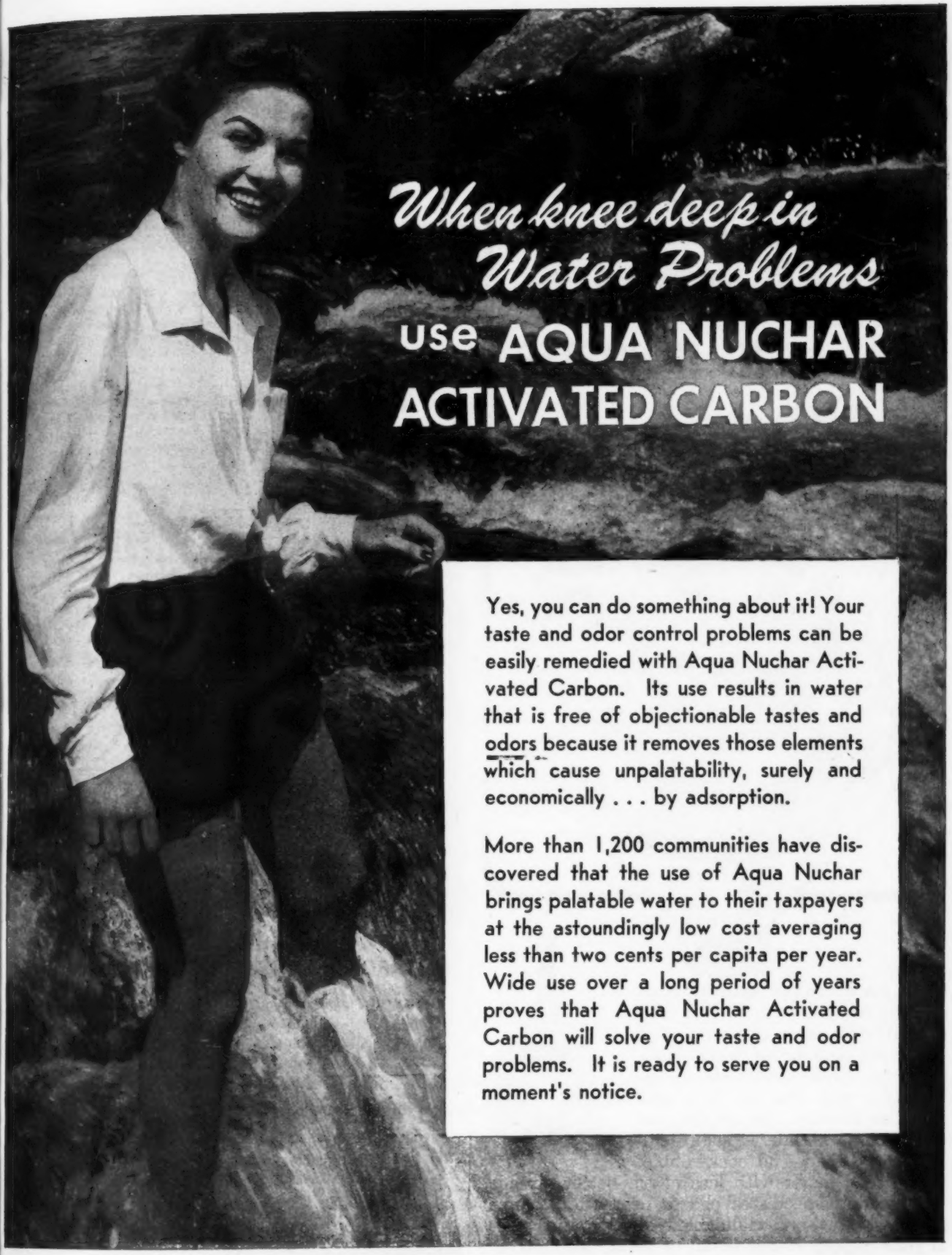

Efficiencies attainable with various capacities at heads between 125 and 225 ft.

Similarly, Unit No. 5 on the acceptance test on March 3, 1927 showed 83.3 per cent efficiency and, when tested again on January 31, 1933, it showed 83.9 per cent.

•

For further particulars and other instances, ask for Publication P-3225.

**DE LAVAL STEAM TURBINE CO. . . TRENTON, N. J.**




Yes, you can do something about it! Your taste and odor control problems can be easily remedied with Aqua Nuchar Activated Carbon. Its use results in water that is free of objectionable tastes and odors because it removes those elements which cause unpalatability, surely and economically . . . by adsorption.

More than 1,200 communities have discovered that the use of Aqua Nuchar brings palatable water to their taxpayers at the astoundingly low cost averaging less than two cents per capita per year. Wide use over a long period of years proves that Aqua Nuchar Activated Carbon will solve your taste and odor problems. It is ready to serve you on a moment's notice.

NUCHAR — INSURES PALATABLE DRINKING WATER

**INDUSTRIAL CHEMICAL SALES**

DIVISION WEST VIRGINIA PULP AND PAPER COMPANY

230 PARK AVENUE, NEW YORK 17, N.Y. · 35 E. WACKER DRIVE, CHICAGO 1, ILLINOIS · 748 PUBLIC LEDGER BLDG., PHILADELPHIA 6, PA. · 844 LEADER BLDG., CLEVELAND 14, OHIO

# *Better* THREADING WITH *Less* WORK

*with this direct-action, non-wobbling*

# RIDGID

## No. 1R POSTER

● You see its advantages the minute you compare this No. 1R with any other poster threader. The quick-set fool-proof workholder saves you time—and no bushings to bother with. Handle pulls head and dies directly—no indirect action over workholder—posts merely taper thread—no cockwobble, you thread faster with less effort, better threads. Alloy or high-speed steel chaser dies for 1" to 2" pipe. A rugged steel-and-malleable tool at popular price! If your Supply House is out of them, keep asking.

**RIDGID**

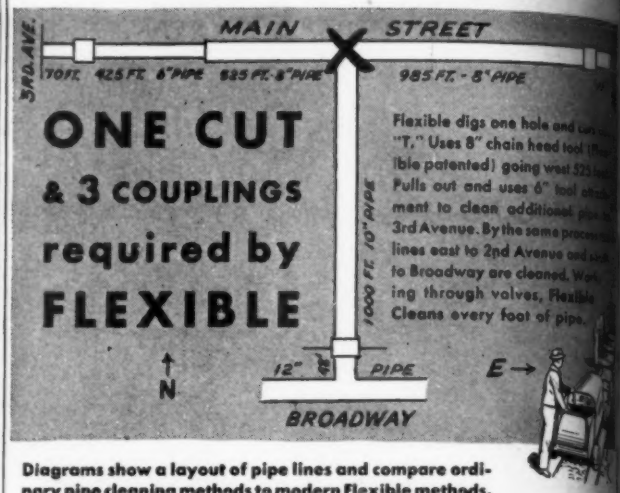
**WORK-SAVER PIPE TOOLS**

THE RIDGE TOOL COMPANY · ELYRIA, OHIO, U. S. A.

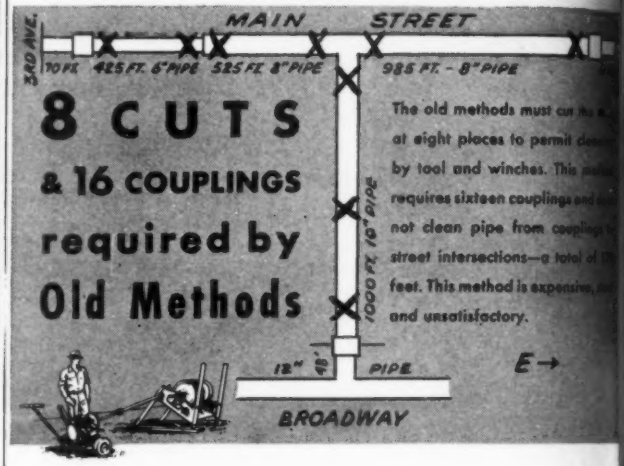
# SAVE CUTS

## IN THE STREET WITH

# FLEXIBLE




Diagrams show a layout of pipe lines and compare ordinary pipe cleaning methods to modern Flexible methods.
X MARKS DIG-UPS ☐ MARKS VALVES




## FLEXIBLE CLEANS EVERY FOOT OF PIPE

A FLEXIBLE pipe cleaning crew can clean these 3,114 feet of pipe of two different sizes from a single dig-up, whereas, ordinary cable-and-winch methods would require eight dig-ups and cuts in the line. Flexible tools and methods make the difference. And the difference amounts to a great deal of money when you consider the cost of each dig-up.

Flexible's special equipment and "know how" can save money for your city. Bring your toughest pipe cleaning problems to Flexible — no job is impossible.

**WE CLEAN PIPE FROM 2" TO 72"**

**FLEXIBLE UNDERGROUND PIPE-CLEANING CO.**

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Gulfport, Miss.
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401 Broadway
New York 13
29 Condon Ave.
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9059 Venice Boulevard
Los Angeles 34, California

ADVANTAGES OF PRESTRESSED CONCRETE CYLINDER PIPE • NO. 2

# ....In all Sizes

The Lock Joint Pipe Company is now prepared to supply Prestressed Concrete Cylinder Pipe in sizes from 16" to 84" diameter—and even larger—for high pressure pipelines.

Prestressed Concrete Cylinder Pipe retains the fundamental principles of Lock Joint design in having a continuous welded steel cylinder with steel joint rings forming bell and spigot ends with a rubber gasket as a sealing element. The cylinder is lined with a substantial thickness of concrete and after proper curing is spirally wound with high tensile wire under tension.

This method of design makes available pipe in all sizes for higher range of heads with the same economy of first cost and maintenance which Lock Joint Pressure Pipe has always effected. That's one of the reasons you'll find Prestressed Concrete Cylinder Pipe an ideal product for your water supply and distribution mains and oil or gas transmission mains.

*A Hazen-Williams Hydraulic Slide Rule will gladly be sent upon request with our compliments.*

LOCK JOINT *Reinforced Concrete* PRESSURE PIPE

## LOCK JOINT PIPE COMPANY

*Established* 1905

**P. O. BOX 269, EAST ORANGE, NEW JERSEY**

Denver, Colo. · Chicago, Ill. · Kenilworth, N. J. · Kansas City, Mo. · Rock Island, Ill.
Joplin, Mo. · Valley Park, Mo. · Cleveland, Ohio · Hartford, Conn. · Navarre, Ohio

**SCOPE OF SERVICES** *Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply and Distribution Mains of large diameter as well as Concrete Pipe of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous lines.*

%Proportioneers% Heavy Duty Midget Chem-O-Feeder—the famous Little Red Pump—is the modern way to protect your water supply. If you are plagued with the spectre of dangerous undertreatment, or are worried about the bad taste and expense resulting from wasteful overtreatment, let the Little Red Pump solve your problem. This inexpensive pump feeds all water treating chemicals with enduring accuracy; its design is up-to-date with the See-Thru plastic pump head to clearly show the action of the check valves and the flow of the liquid. Feeding rate is readily adjustable—the pump does not require an expert operator.

Over 18,000 installations of %Proportioneers% are establishing records for dependable, precise chemical feeding. Let us know your requirements.

*%Proportioneers% Heavy Duty Midget Chem-O-Feeder*




*Write for Bulletin SAN-3*

# % PROPORTIONEERS, INC. %

**9N CODDING STREET, PROVIDENCE 1, R. I.**

# WATER WORKS & SEWERAGE

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E. S. Gillette, Publisher

EDITORIAL OFFICE
155 East 44th Street, New York, N. Y.
L. H. Enslow, Editor

## COMING!

### "Operation of Activated Sludge Plants"

Frequently tries the soul of the operator and the plant manager. As an aid and practical guide to activated sludge plant operators, this article has been developed by a highly observant contributor of long experience in dealing with the process and studying its behavior under a variety of conditions. We are happy to be able to reproduce this highly valuable operating guide which was developed as a lecture delivered to the recent Pennsylvania Short Course for Sewage Works Operators, and written for small as well as large plant operators, by—

DR. GAIL P. EDWARDS, Chief Chemist,
Dept. of Public Works, New York City.

### Treating Mine Water for Domestic Use

Is an article describing the modern water treatment plant and method of treatment employed in producing a domestic water supply in a plant which is perhaps at the highest elevation of any water treatment plant in the world. The authors are—

ROBT. WAMSLEY and W. E. JONES,
Climax Molybdenum Co., Climax, Colo.

### A Unique Solution Feeder

Has been constructed by an eminently practical operator for feeding activated carbon in suspension at a small filter plant. It is inexpensive and has performed satisfactorily. The same design of feeder would serve admirably for feeding hydrated lime, clay for bettering coagulation, the so-called "mud alum" or "activated alum" or any other material in suspension. The description of this feeder comes from "inventor"—

VESTER OPIE, Chief Engineer.
Dept. of Water and Light, Paris, Mo.

### Trickling Filter Operation and Results

Is a three-part treatise on the interpretation of single and two-stage high capacity trickling filter results and the chief causes of poor results. This exhaustive study, with particular reference to "Aero-filters," has been made by—

J. A. MONTGOMERY, Chief Engineer,
Lakeside Engineering Co., Chicago.

### Build Your Own—Solution Feed Control

Is another in a series of successful gadgets developed at the Baltimore Filtration Plant. The describer is—

A. A. BAILEY, Filtration Engr.,
Montebello Filters, Baltimore, Md.

### Service to Small Plants

The story of how operators of small water and sewage plants can benefit through availing themselves of the technical service which is obtainable without a charge of any nature from many manufacturers serving the water and sewage fields—in particular those which produce chemicals and treatment equipment. This article contains pointers of real value from a former treatment plant superintendent who has since made a success in the chemical field. He is—

CHRIS. F. BINGHAM,
Virginia Smelting & Refining Co., Norfolk, Va.

### Delayed Meetings Reports

It is with regret that we could not include in this issue the reports covering the meetings last month of the **Western Pa. Section of A.W.W.A.**, the **Pa. Water Operators' Assn.**, the **Michigan Section of A.W.W.A.** These reports will appear in our November issue.

VOL. 92, NO. 10

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### *Hold-Over Articles*

The following articles and reports, planned for this issue, could not be included because of their incompleted status in the strike-bound plant of our printers. For the most part, these will appear in our November issue **in addition to** those already scheduled for that issue.

London's Water Supply
By Lt.-Col. E. F. W. Mackenzie, O.B.E.
Director of Water Examination
Metropolitan Water Board
London, England

Centrifugal Pump Peculiarities
By Robert W. Angus, Consulting Engineer
Toronto, Ontario

Water Treatment to Reduce Chemical Odors
By Lawson Haynes, Plant Supt., and
Wallace Grant, Chemist
West Virginia Water Service Co.
Charleston, West Virginia

Industry Converts Sewage Works Effluent into Water Supply
By Wm. P. Hill, Engineer
Bethlehem Steel Co.
Sparrows Point, Maryland

NEWWA'S 64th Annual Meeting
Staff Report

NESWA'S Fall Meeting
Staff Report

H. P. GILLETTE, Pres.; E. S. GILLETTE, Vice Pres. and Publisher; L. H. ENSLOW, Vice Pres. and Editor; J. C. BLACK, Mgn. Editor; GEORGE E. SYMONS, Associate Editor; Editorial Associates—J. R. BAYLIS, A. M. RAWN, H. A. FABER; H. J. CONWAY, Adv. Editor; L. D. SANDERS, Make-Up Editor. *Chicago Office*, Norman T. Burke, Rep., 330 S. Wells Street; *Cleveland Office*, Lee B. McMahon, Mgr., Leader Bldg.; *New York Office*, J. M. Angell, Jr., Mgr., 155 East 44th Street; *Los Angeles Office*, Don Harway, Rep., 816 W. Fifth Street.
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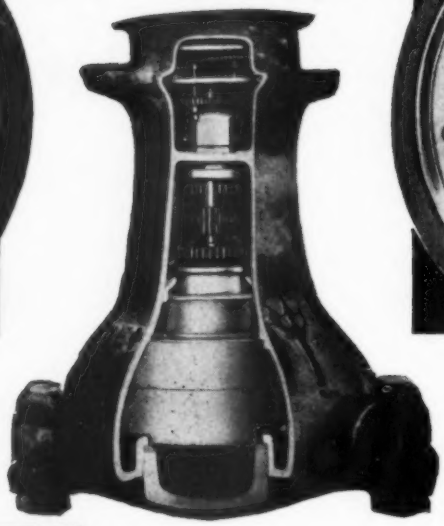

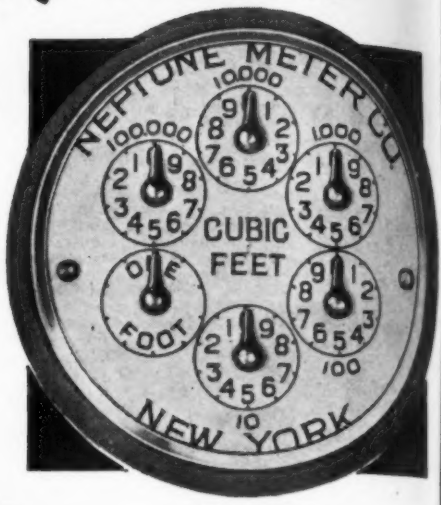


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**ECONOMY IN INVENTORY - A RESULT OF TRIDENT**

# Interchangeability

WATER WORKS & SEWERAGE

VOL. 92, No. 10 *A Gillette Publication* OCTOBER, 1945

# HEATING AND FAILURE OF BEARINGS DUE TO LITTLE APPRECIATED CAUSES

By D. B. HOOVER
Electrical Design Engineer
WESTINGHOUSE ELECTRIC CORP.
PITTSBURGH, PA.

SHAFT currents in motors and generators may cause excessive bearing wear and resultant bearing failure.

In most cases current that is present in the shaft must cross the bearing oil film and flow into the bearing shell. This action pits the bearing surface and *often the shaft* also, causing bearing wear and frequently bearing wiping. The rate of bearing wear may be rapid causing bearing failure in a matter of days, or it may be of a slower nature causing bearing failure after a longer period of operation. Such bearing wear is accelerated if the current is large and the loading high.

The surface of a bearing which has suffered from bearing currents is covered with pit marks of various degrees. These pits are often found in bands around the bearing surface (Fig. 2), and if the current is very severe the shaft itself will also have pit marks.

### *Detection of Bearing Currents*

A simple method of determining the presence of possible bearing currents is to attach a short heavy cable to the bearing bracket or bearing pedestal of the machine, and then touch the other end of the cable to the rotating shaft as illustrated in Figure 3. Persistent electrical sparks appearing between the shaft and the cable end indicate the likelihood of damaging bearing cur-

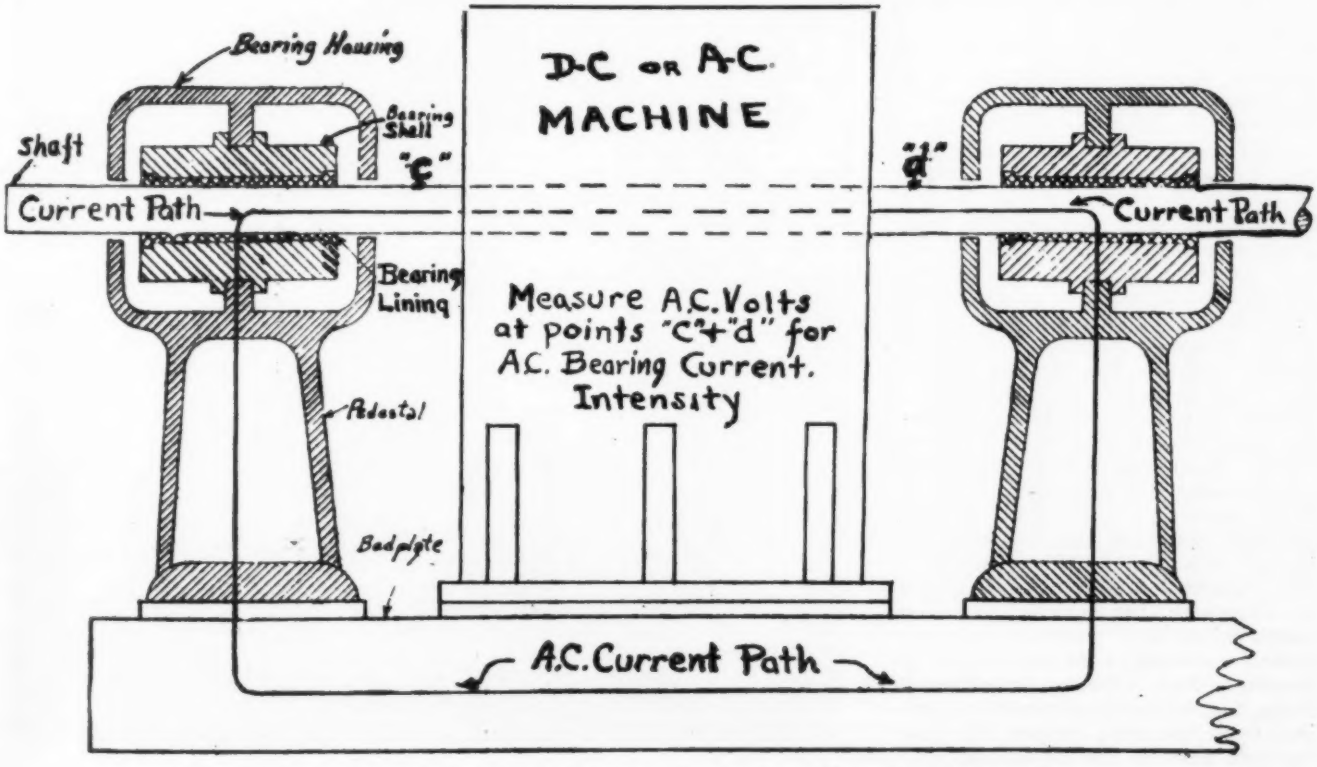



Fig. 1—Path of A-C Shaft Currents Produced by Magnetic Dissymmetry

Fig. 2—Bearing Surface Which Has Been Pitted by Shaft Currents
*(Magnification 54 times—note band effect from pitting and wear.)*

rents. However, this test in itself will not show if there are bearing currents of sufficient magnitude to damage the bearing. Nevertheless, if the bearing surface has a pitted appearance and if sparks are present between the shaft and cable, it is practically certain that damaging bearing currents do exist.

Bearing currents may be either direct or alternating, depending on their origin. Magnetic dissymmetry of a machine will cause an a-c voltage to be generated in the shaft. This voltage will tend to circulate current through the shaft, cross the bearing oil film, through base and thence back through the other bearing as shown in Figure 1. Bearing currents of this type may be present even in a perfectly designed machine, since manufacturing variations may introduce slight magnetic dissymmetry in such machines.

Magnetization of the shaft may produce d-c bearing currents. The method of connecting the series and commutating fields of a d-c machine may produce a magnetizing effect on the shaft of the machine if the load current is allowed to make an uncompensated turn around the shaft. This action is exactly the same as an elementary iron core electro-magnet which has turns of wire about its core. It is possible by proper connection to reduce the shaft magnetization to a small value. This magnetizing effect will cause magnetic flux to pass along the shaft, across the bearing oil film, through the base and thence back through the other bearing in the manner illustrated for current flow in Fig. 1. Therewith, the flux set up by the magnetizing force generates a homopolar d-c voltage in the shaft along the bearing. This voltage, if sufficiently large, causes direct currents to circulate from the shaft through the bearing and back to the shaft. In other words this form of bearing current circulates locally within the bearing, and does *not* flow through the entire length of shaft as is found there in the case of a-c machines.

### *Correctives*

A-C bearing currents may best be eliminated by insulating one bearing, including holding down bolts, dowels, oil piping and grounded connections. This insulation will break the path of the current and no further bearing current is possible if the insulation is kept clean and in good condition.

D-C bearing currents may best be eliminated by reducing the magnetizing force around the shaft. Bearing insulation will reduce the flux and thereby reduce the internal circulating bearing currents. The reduction gained by this method is often enough to eliminate bearing damage, but it is recommended that the manufacturer of the machine be contacted in this case.

*Both* a-c and d-c bearing currents may be reduced by shunting most of the bearing current *out* of the bearing. This may be accomplished by adding brushholders, with brushes that ride on the shaft, to the bearing pedestal or bracket in a manner similar to that indicated in Figure 4.

Brushes for this application must have very low resistance, since the resistance of the brushes must be much less than the resistance of the bearing oil-film. Metal graphite brushes with high copper content are suitable for this use, and the resistance of a clean oil film, as pointed out later, has a distinct value in connection with this method of correction. This method will usually reduce bearing currents to a safe value in *all* types of bearing currents. However, the brushes require a certain amount of maintenance which cannot be overlooked.

The presence of some bearing current may not damage the bearings of a ma-

Fig. 3—Sparking Method for Detection of Shaft and Bearing Currents

chine. The magnitude of the damage is dependent on the magnitude of bearing current, bearing loading, condition of the oil, and condition of the bearing and journal surfaces.

### *Measure of Shaft Current the Index*

The voltage measured across the shaft on each side of a bearing is an indication of possible d-c bearing currents. Usually a voltage of 150 millivolts (measured with a d-c millivolt meter) will not circulate currents of sufficient magnitude to cause damage in a sleeve bearing. If an a-c voltage is present across the shaft of a machine (from points on each side of the motor or generator rotor on the shaft and inside of each bearing pedestal or bracket—see Fig. 1) it is evidence that some a-c shaft current may be present. However, it is not possible to secure reliable readings of the magnitudes of bearing currents and voltages with ordinary instruments. An oscillograph will give much better results when used with the proper shunts and elements. Even if reliable readings are secured they are difficult to interpret in terms of possible damage because of the variable factors entering into bearing damage.

### *Value of Clean Oil in Bearings*

Proper maintenance of oil and bearing conditions tends to eliminate wear caused by bearing currents, since a good *clean* oil film increases resistance to current flow. This oil film acts as an insulator except for very minute projections on the bearing surface which may press through the oil film. Some machines are originally built with bearings that are insulated, depending on the type of bearing, the speed of rotation, the bearing load, and the size and rating of the machine. Such insulated bearings should be checked periodically, however, to make sure that they remain insulated. Often mechanical parts which are close to the bearing will be moved and will short across the bearing insulation, causing shaft current to flow. Likewise dirty or poor insulation will cause the same trouble. These points, however, can be readily checked at each inspection.

It is wise to consult the manufacturer of the motor or generator on any cases of serious shaft currents since he is best able to make recommendations as to how a particular bearing should be insulated, or what other steps should be taken to eliminate this trouble.

### *Roller or Ball Bearings Most Susceptible to Current Attack*

Roller or ball bearings are more likely to have bearing currents and abnormal heating than sleeve type bearings, since the contact between the bearing and the shaft is extremely good. Good contact will allow more current to flow through a given bearing for the same bearing voltage. Also the high speed rollers or balls in the bearing will cut any flux passing from the shaft to the bearing at a high rate. This induces bearing currents within the balls or rollers themselves causing overheating. Therefore, the amount of shaft current or flux must be smaller for roller or ball bearing operation than for sleeve bearing operation.

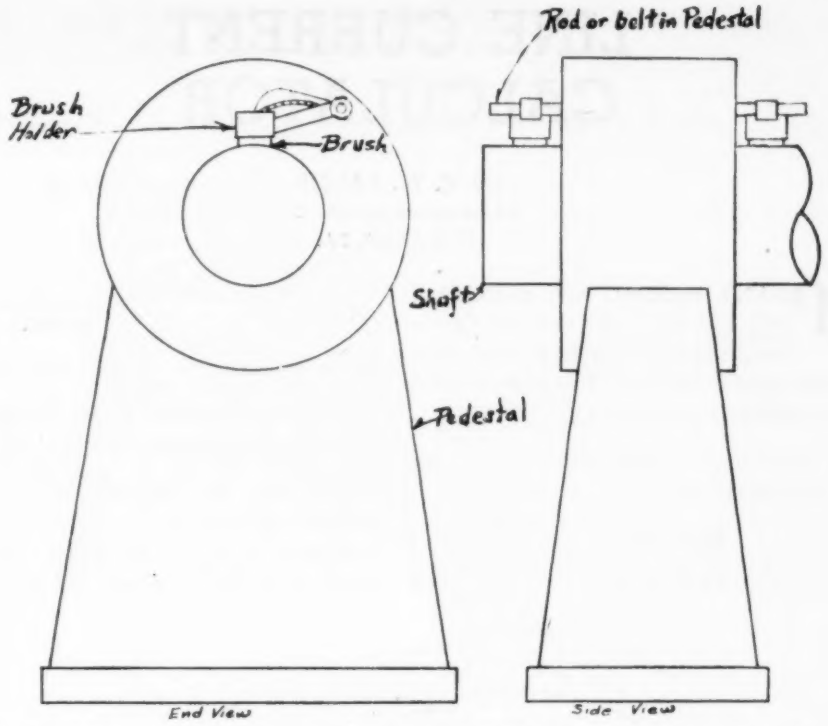



Fig. 4—Scheme for Shunting Out Bearing and Shaft Currents with Brushes Riding on Shaft Close to Bearings

There have been a few cases of bearing currents caused by an external source. Widely spaced buses carrying large direct currents can set up a strong magnetic field which may cut the shaft and thereby induce a voltage in the shaft. This in turn can generate bearing currents. Closely spaced transposed buses will cure this condition. However, to eliminate the effects of old residual magnetism, it may be necessary to demagnetize the shaft and surrounding structures when the new transposed closely spaced bus is installed. Shunting brushes, mentioned before, will help prevent damaging currents in the bearings of the roller, or ball type also.

A grounded coil on the rotor of a motor or generator may cause current to flow through a bearing. Periodic insulation resistance readings on each machine would detect this condition, possibly before any damage materializes.

Ground currents flowing through the foundation of the building may flow up through the parallel current path formed by the bearings and shaft of the machine. A low resistance foundation or grounding cables would help remedy this type of trouble.

In general, bearing currents may originate from many sources. The best procedure to follow is that of elimination. Eliminate each possible source as the investigation proceeds. First, make a complete bearing inspection and then check the machine, using the sparking test. Investigate the possibility of a-c or d-c bearing currents generated by the machines themselves and eliminate or remedy this if required. Completely external causes should then be looked into if necessary, but external origin of bearing currents of damaging magnitude is very rare.

---

## McLaughlin Named Philadelphia Dir. of Public Works

Martin J. McLaughlin, Chief of the Bureau of Water of Philadelphia for the past three years, was named Director of Public Works of that city to succeed John H. Neeson who died early in September.

M. J. McLaughlin

Mr. McLaughlin, a graduate of Villanova College, held the same position from 1936-40, after which time he became Engineer of the Municipal Airport. The water works profession knows Mr. McLaughlin for the work he has done to modernize Philadelphia's supply, and to handle the severe problems of industrial demand and drought during the past few years.

# LINE CURRENT CALCULATOR

By V. W. PALEN
Westinghouse Electric Co.
PITTSBURGH, PA.

PLANT engineers and electricians will find this Line Current Calculator useful for quickly determining amperes that will flow in motor and transformer circuits.

The single phase unit solves the equations:

$$I = \frac{Hp \times 746}{E \times PF \times Eff} \quad \left[\text{for motor current}\right]$$

$$I = \frac{Kva \times 1000}{E} \quad \left[\text{for transformer current}\right]$$

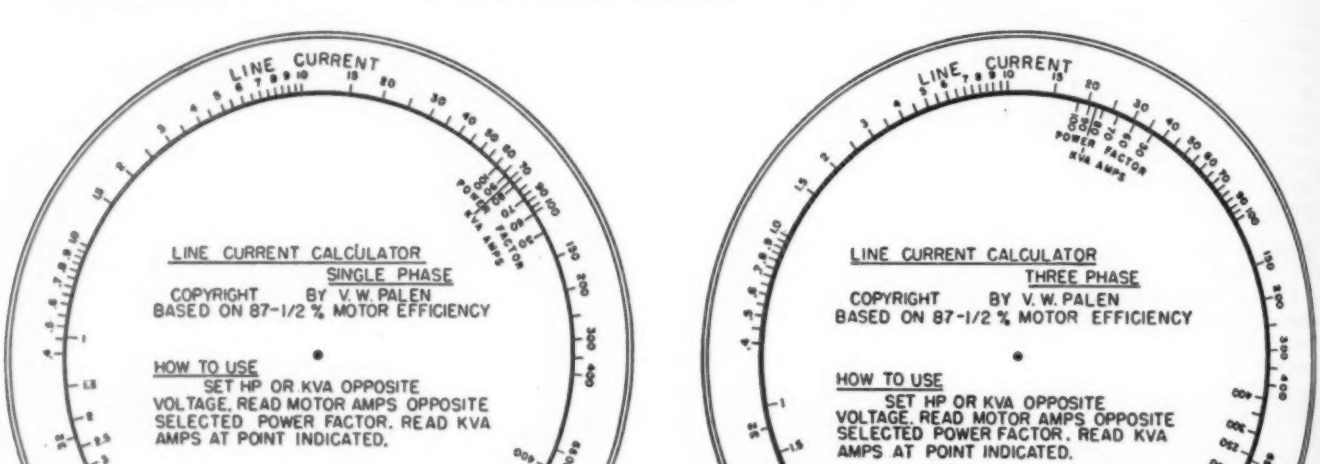
Where E = voltage between line wires
PF = power factor
Eff = efficiency—87.5% assumed

Three phase equations solved by the three phase unit are the same as above except that the denominator of the fraction includes $\sqrt{3}$.

Suppose a 5 hp. single phase 220-volt motor is to be installed. Set the dial accordingly—assuming 80 per cent power factor, opposite 80 read approximately 24 amps. Now suppose a 15 kva. three phase 440-volt transformer is to be installed. Set the dial properly—opposite kva. amps read approximately 20 amps. With the line current thus determined, proper wire size can be selected to carry the load.

Several voltages that are seldom used around plants are included for the convenience of those who might have occasion to utilize them.

Cut along the inner and outer circles to make two rings and two discs. Mount these pieces on separate pieces of cardboard using rubber cement. Punch the center holes carefully. Insert brass bolts (with washers) to hold the parts together. Add nuts to the bolts and tighten—the discs should turn easily yet hold their setting. A drop of solder on the nuts makes the assemblies permanent.


LINE CURRENT
LINE CURRENT CALCULATOR
SINGLE PHASE
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BASED ON 87-1/2 % MOTOR EFFICIENCY
HOW TO USE
SET HP OR KVA OPPOSITE VOLTAGE. READ MOTOR AMPS OPPOSITE SELECTED POWER FACTOR. READ KVA AMPS AT POINT INDICATED.
HORSEPOWER OR KVA
PHASE TO PHASE VOLTAGE
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LINE CURRENT
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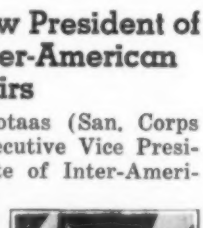
HORSEPOWER OR KVA
PHASE TO PHASE VOLTAGE
POWER FACTOR
KVA AMPS

Line Current Calculators for One and Three Phase Circuits

## Col. Gotaas New President of Institute of Inter-American Affairs

Col. Harold B. Gotaas (San. Corps AUS), formerly Executive Vice President of the Institute of Inter-American Affairs and Director of the Division of Health and Sanitation, was the unanimous choice of the Board of Directors for President of the Institute to succeed Dr. George C. Dunham, who resigned on August 30.



Col. H. B. Gotaas

Col. Gotaas, who holds a Doctor of Public Health degree from Harvard, has been Dr. Dunham's first assistant for the past two years and has spent much of his time traveling in the countries of Central and South America. Prior to his appointment in 1944 as Exec. Vice Pres., Col. Gotaas was Ass't Dir. of the Div. of Health and Sanitation and Chief of the Engineering Section.

As recognition for his contribution to health and sanitation in South America, Col. Gotaas has received two decorations, each being the highest award of the country to a foreigner. The Order of the Condor of the Andes was presented by Bolivia, and the Order of Merit by Chile.

The work of the Institute is now on an economic development basis, operating on a cooperative program of health and sanitation, agriculture and food supply, transportation, and education.

Col. Gotaas believes this program is basic to the stimulation of trade with South America which offers an excellent export area for the United States. This area, he believes, is better at the present time than either China or Europe and has a sizeable dollar balance as the result of war activities.

The program of the Institute will run well toward the end of 1948. The provision of better sanitary facilities has been one of the primary purposes of the program. Over 260 environmental sanitation projects have been undertaken since the program began.

# WHY USE METERS?

## Arguments Pro and Con for Water Supply Service on a Metered Basis

By GEORGE C. BUNKER
Consulting Engineer
NATIONAL INSTITUTE OF SANITARY WORKS
CARACAS, VENEZUELA

This particular article was prepared, at our request, for inclusion in the forthcoming issue of the *Manual de Ingenieria Sanitaria*, the Latin-American version of the Reference and Data issue of *Water Works and Sewerage*. Mr. Bunker has long been identified with the development of water supplies in Latin-America and has prepared an article which has sound application to North American as well as South American practice. For this reason we are also printing Mr. Bunker's well-presented arguments in English.

THERE are two fundamental reasons for the use of water meters: first, the sale of water by meters is the only equitable method of distributing among the consumers the expenditures for developing and operating a water works; and second, it is the only practical method yet found for controlling the waste of water by the consumers.

The Author

The sale of water on a flat rate basis may be compared to selling a fixed amount of milk at a certain price per month to different families without regard to the number of persons in each family or the varying amounts which they might use or waste. Milk is sold by a meter, the meter being a bottle of definite volume.

The sale of electricity and gas by meters is generally accepted as the fairest method of buying these commodities which must be manufactured and distributed by cables and wires in the first case and by pipe lines in the second case. It is true that water is not manufactured inasmuch as it may be obtained from surface streams or from the ground and hence many persons consider it a free commodity that should be distributed without restrictions. However, money must be expended to collect water, to pump it, to convey it to reservoirs, to purify it and to distribute it to the consumers. For example, the water in the Magdalena river in Colombia, S. A., is free to all persons who wish to take it but by the time it is purified and delivered to the consumers in Barranquilla, it can by no stretch of the imagination of a free-hearted politician be considered as a commodity free of charge.

Many consumers either carelessly or willfully waste water in various ways. Among the worst offenders of this class are those who allow water to run continuously from some of their fixtures. A much larger number of consumers permit leakage from faucets and water closets. Many consumers feel that the waste and leakage in their individual houses or buildings is insignificant and therefore make no effort to stop the waste; and generally pay little or no attention to leakage unless it causes inconvenience, interferes with the service, or results in property damage. If only a few consumers assumed this attitude, it would make little difference, but with a large number assuming it the results are disastrous both to the service rendered by the water works and to finances. In public schools, army barracks, hospitals and municipal buildings the leakage of water is often an enormous amount. The excessive irrigation of grass, shrubs and flowers in parks and parkways by employees of water works operated by municipalities is another great source of waste of water.

### *Two Methods of Controlling Waste and Leakage*

There are two methods of controlling waste and leakage of water: one is by means of house-to-house inspections and the other is by the installation of meters.

House-to-house inspections, as a means of controlling waste and leakage, are unsatisfactory as they are only partially effective in reducing the loss of water. No permanent benefit is derived from the money expended upon the inspection method for the results last only as long as the inspections are continued. Some of the inspectors, working for small wages, will accept tips in return for making a favorable report to their superior. The inspections are generally disagreeable and annoying to the occupants of houses and to be effective they must be accompanied by the rigid enforcement of penalties against those who are found guilty of permitting waste and leakage. A regulation involving penalties sounds good on paper but in due course of time it generally takes its place among the numerous other unenforced municipal ordinances.

The cost of frequently repeated schedules of inspections will be approximately equal to the cost of reading and maintaining meters but the results will not be as effective as those from installation of meters.

A meter works as an automatic mechanical inspector and is on the job all the time. No human inspector can equal the efficiency of a meter as has been proved in hundreds of cities.

### *To the Consumers' Benefits In the End*

In communities with meters in service, each consumer pays for the water he wastes, assuming that the allowance of water with the minimum rate is not excessive, and there is a constant incentive for each to reduce to a minimum the amount of waste and leakage on his property. When the water supply of a city is 100 per cent metered, the consumer pays only for the proportion of water that he receives and nothing more. No consumer may use more water than another for the same price. The consumer does not have to pay for the water wasted by others; he receives that for which he pays and pays for what he receives.

### *The Small Consumer And Fair Rates*

In communities where the flat rate system is used the small consumer generally pays more than his share of the expenditures for the construction and maintenance of the water works.

One of the more common protests against the installation of meters is that they tend to reduce the use of water for hygienic purposes—especially by people living in small houses of low value—below the amount which is supposed to be necessary for their health. The adoption of a minimum rate which provides an ample allowance of water for all domestic purposes eliminates the above protest. A minimum rate is an amount that is collected for a fixed volume of water even though the water registered by the meter is less than the fixed volume. A slight reduction in the rate may be made in favor of occupants of houses of low value with the idea that their incomes are less than those in houses of greater value. This is a common method of assisting the poorer people in South American cities.

Hazen[1] claimed that "much of the unfortunate and ignorant opposition to the use of meters has been caused by unreasonable and unjust methods of charging for the water passing the meters."

In Cali, Colombia, for example, when the use of meters was started in 1933,

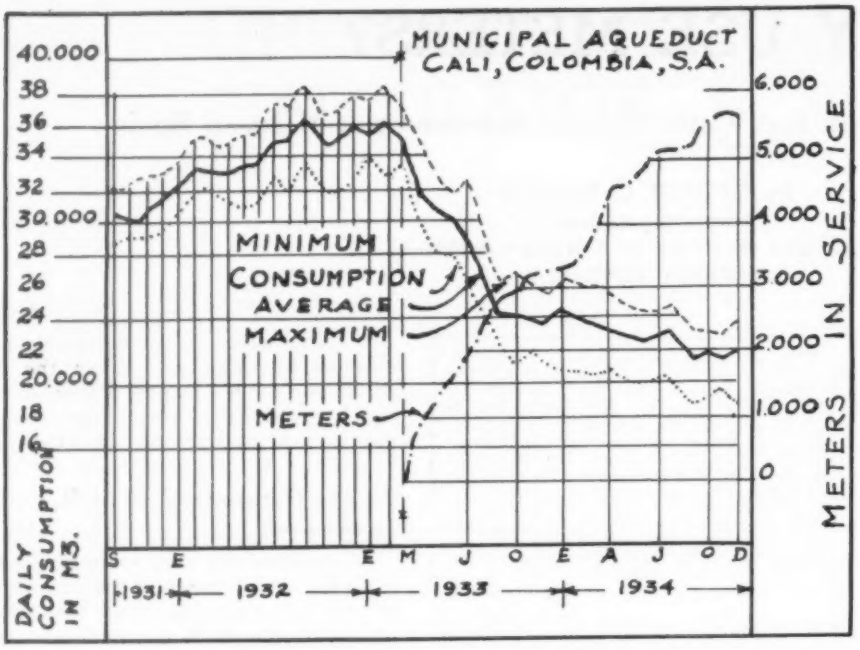



Fig. 1. Results of metering in Cali, Colombia.

a minimum rate of 1.20 pesos per month was established for houses valued at 1000 pesos or less with an allowance of 36,000 liters of water (9500 gal.). For houses valued at more than 1000 pesos a minimum rate of 2.00 pesos per month was established with an allowance of 50,000 liters (13,200 gal.). As a result of protests made by some of the people in these classes that the rates were excessively high and the allowances of water were too low, the municipal council, contrary to the recommendation of the Board of Administration, increased the above allowance to 45,000 and 60,000 liters (11,900 and 15,800 gal.) respectively.

The records during the last 12 years indicate that the average metered consumption of the houses valued at 1000 pesos or less never reached 36,000 liters per month per house. Therefore, it is evident that the original allowance of 36,000 liters per month was high enough and met the legitimate needs of the occupants of the houses. This allowance is equivalent to 1,184 liters (312 gal.) per day per house or an average of 169 liters (44.5 gal.) for each of 7 occupants and of 197 liters (52 gal.) for each of 6 occupants.

### *Some Recent Rate Patterns*

The waste of water through municipal services may be greatly reduced by furnishing it through meters and selling it at a special price. The National Institute of Sanitary Works of Venezuela made a contract, effective January 1, 1944, for the exclusive exploitation of the municipal water works of the municipalities of the Federal District. This contract contains the following clause: "The consumption of water by the municipality will be paid to the Institute according to the following tariff per cubic meter: the first 131,500 cubic meters (34.7 mil. gal.) during the first quarter at 0.25 Bolivar; the following 50,000 cubic meter (13.2 mil. gal.) during the second quarter at Bs. 0.22; the following 50,000 cubic meters during the third and fourth quarters at Bs. 0.18; and any excess over the above volumes at Bs. 0.15."

(1) Hazen, Allen. "Meter Rates for Water Works." John Wiley & Sons, Inc.

Another clause in the came contract, establishes that subscription (payment) of water service will be paid by the proprietors of houses at the rate of Bs. 120.00 per annum, to be made in advance quarterly, which will entitle them to an allowance of 110 cubic meters per quarter, equivalent to 1,200 liters per day; and the excess of water over this consumption will be collected either monthly or quarterly at the rate of Bs. 0.25 per cubic meter to the occupant of the house or property. The proprietors of not more than one house the value of which does not exceed twelve thousand bolivars (Bs. 12,000), when such houses are inhabited by their own proprietors, are entitled to a reduced tariff allowing them 68 cubic meters (18,000 gal.) quarterly, equivalent to 745 liter (192 gal.) per day, for the amount of sixty bolivars (Bs. 60.00) per annum, to be paid quarterly, and a charge of Bs. 0.25 per cubic meter will be made for any excess of water over this amount.

Under the flat rate system many of the consumers become accustomed to the waste of water in their houses and are more indifferent to it as the years pass. It has been the general experience that the volume of water drawn from the distribution system by the inhabitants of a community increases more rapidly than the population. Eventually the proportion of water wasted equals or is greater than the legitimate consumption and nothing is left for new consumers. Sometimes the waste of water is so great that a continuous 24-hour service can not be maintained. When these conditions occur one of the two following measures must be adopted: first, the development of an additional supply of water; and second, the installation of meters.

The first measure will provide temporary relief only, as the waste of water by the old and new consumers will continue, and involves a relatively large capital investment as well as the necessary interest and sinking fund charges. The second measure will make the water wasted by the consumer available for legitimate use and will reduce the amount of the capital investment and other charges.

It is not unusual to effect a reduction of 50 per cent, or more, in the per capita consumption of water when the water services in a community under a flat rate system are 100 per cent metered. After meters have been in service for about one year, the majority of consumers are not only satisfied with the purchase of water by meter but prefer it to the old flat rate system.

### *Two Examples of Metering Results*

Cali, Colombia, furnished an example of the effectiveness of meters in reducing the waste of water (Fig. 1). The installation of meters was started in April, 1933. On December 31, 1934, 71 per cent of the services had been metered and the average daily consumption had dropped to 22,024 cubic meters (5.82 mil. gal.), or 38 per cent less than it was during March, 1933, although 967 new services had been added during the lapse of 21 months. On August 31, 1935, 80.5 per cent of the 8420 services in use had been metered and the average daily consumption had dropped to 19,839 (5.25 mil. gal.) cubic meters or 44 per cent less than it was during March, 1933, although 1607 new services had been added during the lapse of 29 months.

The benefits resulting from the reduction in waste and leakage of water in Cali were as follows: the construction of four filters was postponed; the addition of settled water to the filtered water was stopped; the cost of chemical treatment of the water was reduced; there was an increase in pressure in the central section of the distribution system from 21 to 42 meters of water during the daytime; and filters operated at normal rate.

Fig. 2 indicates the effect of the installation of meters in Bogota, Colombia, S. A. At the end of 1942, with 68 per cent of 37,045 services metered, the average volume of water per service per day was 1760 liters (465 gal.) as compared to 3860 liters (994 gal.) at the end of 1930 when only 7.4 per cent of 15,194 services were metered.

### *The Pressure Loss Bugaboo Isn't So*

The argument is often advanced that meters cause an excessive loss of pressure. Five-eighth inch (16 m.m.) disc meters may be obtained that will

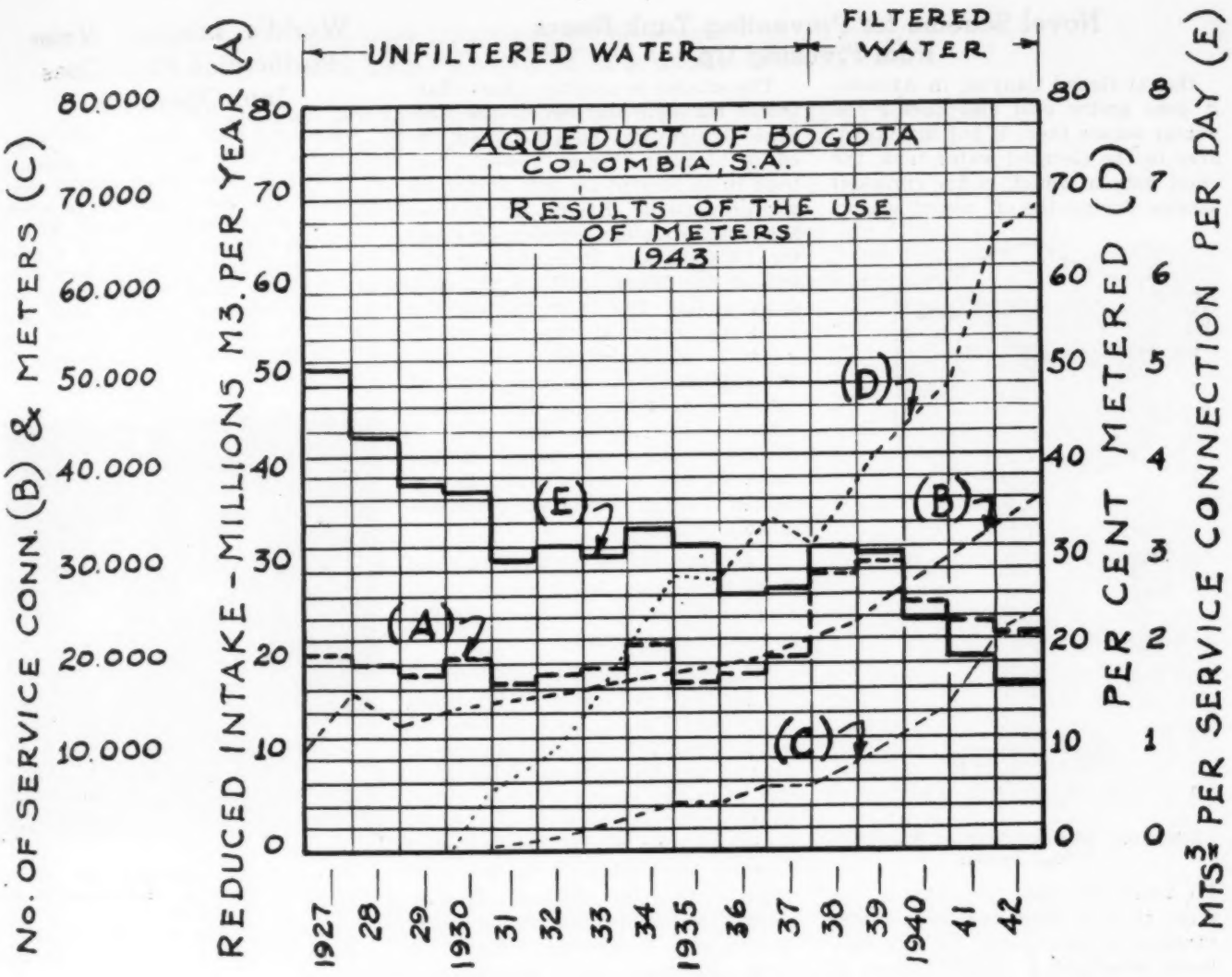



Fig. 2. Results of metering in Bogota, Colombia.

pass a maximum flow of 75.7 liters (20 gal.) of water per minute with a loss of head of only 7.7 meters (25.2 ft.) approximately. In most houses of one family a meter of this size is seldom called upon to pass water at a rate greater than 37.8 l.p.m. (10 gal.) with a corresponding loss of head of approximately 2.4 meters (7.9 ft.). About 75 per cent of the total volumes of water consumed in the average one-family house will flow through the meter at rates varying from 3.8 to 19.0 l.p.m. (1 to 5 gal. per min.) with a loss of head of approx. 0.07 and 0.9 meter (0.23 and 2.95 ft.) respectively.

Instead of reducing the pressure available for the distribution of water within the houses of a community, a metered system will maintain a better pressure than a flat rate system because excessive waste of water in the latter system actually lowers pressure in the street mains.

The conclusion must not be drawn that the installation of meters will eliminate all of the waste in a water works system. Subterranean leakage always exists, and it may amount to 25 per cent of the volume of water that enters the distribution system.

When the services in a distribution system are 100 per cent metered, or only 90 per cent metered, and there is a Venturi meter or other means of measuring the water that enters the system, the approximate amount of subterranean leakage may be estimated by subtracting the grand total of the volumes of water passing the meters on the services from the volume of water that enters the system.

If the above equipment is used properly, and is accompanied by a diligent search for leaks and is followed by the necessary repairs, capital investment for providing more water to run to waste may thus be prevented.

## Construction Limitations Removed

L-41 Revoked Oct. 15

As of Oct 15, construction order L-41 was revoked by WPB and limitations on home, commercial, and public works construction were removed. WPB Chairman J. A. Krug believes that the construction industry and its pipeline industries can now go ahead with plans for filling the pent-up demand for housing and other building.

This means that water and sewage facilities will soon expect a major turn in construction, for new housing developments will require adequate water and sewage services.

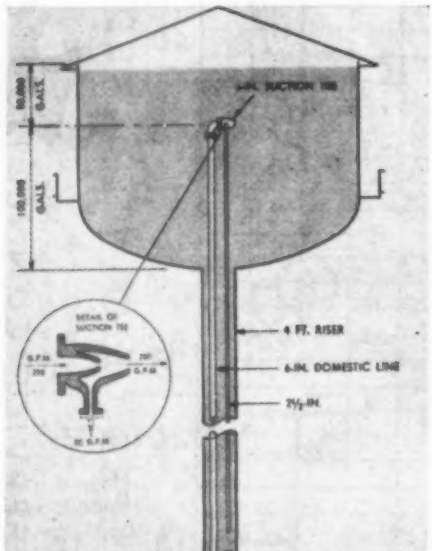
Certain key building materials, still in tight supply, include brick, cast iron pipe, gypsum board, clay sewer pipe, structural tile, and asphalt roofing materials. Lumber hasn't eased up entirely in some communities but the situation is improving.

## War Dep't Honors Fire Underwriters

Over the radio on July 7, Lt. Gen. Eugene Reybold, chief of engineers, presented a special War Department Citation to Wilbur E. Mallalieu, Gen. Mgr. of the National Board of Fire Underwriters, for the accomplishments of that organization in fire protection and fire prevention as prime factors in military operations.

## Novel Scheme for Preventing Tank Risers from Freezing Up

Out at Grand Canyon, in Arizona, it gets pretty cold and during the winter season there is but little turnover in the elevated water tank, the chief duty of which is fire sprinkler service during the off resort season.




Schematic Sketch of Riser Recirculating System

To avoid the solid freeze-up of the tank riser during the low winter turnover period, Santa Fe Ry. engineers developed a unique scheme of intermittently circulating water from the bottom upwards through the riser.

The scheme in question (here illustrated through courtesy of the Chicago Bridge and Iron Co. and the editor of their "Water Tower") has been in successful use now during 15 winter seasons. Briefly, it involves the installation of a suction tee eductor (Watson and McDaniel) on the end of the filling pipe. A 2½ inch drop suction line from the eductor picks up water at the rate of 30 g.p.m. from the bottom of the riser and discharges it into the center of the tank to mix with the warmer water. While an ice shell of 2 in. thickness has been found in the riser, the circulating scheme has prevented further ice shell encroachment.

This information originated from G. L. Davenport, Jr., Division Engineer of Water Supply, Santa Fe Ry. System, Los Angeles.

[This little account brings to mind the fact that the Santa Fe Ry. hauls into Grand Canyon, by tank cars, all water used for domestic purposes. This in turn brings to mind the effective re-use of Grand Canyon water, which involves sewage salvage through heavy chlorination and mechanical sand filtration of the activated sludge plant effluent. The recovered water is returned for re-use in the lawn sprinkling system, for toilet flushing and similar uses which do not require that Grand Canyon's expensively imported "new" water be employed.—Ed.]

## Joe Quinn Leaves Indiana State Dept. of Health

### Takes Position as Ass't to the President of Terre Haute Firm at Alluring Salary

Governor Ralph Gates of Indiana has announced the resignation of Joseph L. Quinn, Jr. as State Sanitary Engineer and Technical Secretary of the Indiana Stream Pollution Control Board. He takes the position as assistant to the president of Holman & Co., Anton Holman Jr., large baking powder manufacturers.

Mr. Holman has many interests in addition to his principal business, and Mr. Quinn's duties and interests will be varied, including public relations. Mr. Holman, who is serving as chairman of the Indiana Flood Control and Water Resources Commission is keenly interested in stream pollution correction, and has established at Purdue University the Holman Foundation, Inc., which fosters and finances research in sanitary engineering and studies looking toward the economic utilization of industrial wastes.

Mr. Quinn, who has in a short time made quite a reputation as a state sanitary engineer, is a graduate of Purdue University. He joined the Indiana Department of Health in 1939. He is chairman of the Indiana Section of AWWA, executive secretary of the Indiana Society of Professional Engineers, director of the Scientech Club of Indianapolis and the Rotary Club of Terre Haute. He holds offices also in numerous other organizations, including the Izaak Walton League, and is a member of all of the more important water and sewage works associations and engineering societies. From AWWA he received the Fuller Award in 1944 and received especial recognition for his work in postwar planning in co-operation with the Joint Committee on Water and Sewage Works Development in its "Blue Print Now!" program.

In losing Joe Quinn, the water and sewage works field has lost a real "spark-plug" and leader. Indiana loses a highly effective and valuable public servant.

## World's Largest Water Purification Plant Goes Into Operation

On Sept. 20th Mayor "Ed" Kelly pushed a button in Chicago's gigantic new filtration plant which started operation of the raw-water pumps which have an overall capacity of 532 MGD.

At the standard loading of 2 gals. /sq./ft./min. rate the filters have a capacity of 320 MGD. However, the demand already exceeds this output and the filters are designed to turn out 500 MGD. whenever called upon to do so.

Mayor Kelly addressing the 600 attending the opening ceremonies at the plant.
(*Note the size of the raw water pumps and the cone-type check valves.*)

The plant, far from being completed because of wartime restrictions on materials and lack of labor, will operate until completion of the filters as a partial purification plant, providing pre- and post-chlorination, coagulation and clarification. When the plant was visited on October 18th, it was putting out about 450 MGD. of clarified water with a turbidity of 2 ppm. or under even without the filters.

The plant was put under construction in 1938 with the expectancy of completion by the summer of 1942, but the wartime restrictions prevented it. This largest water purification plant in the world is supplying 1,350,000 people within a zone representing 54% of the area of the city. When completed the plant will have cost approximately $24,000,000. At present the plant-operating staff is 116, but when within the year the filters will be in operation, the operating staff will be about double the present number.

Conspicuous to the visitor is the amount of wood used temporarily in the plant until aluminum, stainless steel, etc., can be had.

# THE SURFACE AREA OF CYLINDRICAL OBJECTS

## A Chart Applicable to Tanks, Pipe and Pipe Lines, Drums, Conduits, Poles, Stacks, Standpipes, etc., etc.

Contributed by
W. F. SCHAPHORST, M.E.
NEWARK, N. J.

THE dotted line drawn across the chart shows that if the diameter of a cylinder, pipe, tube, tank, or what not, is 20 inches (column A) and the length is 191 feet, (column C), the total area is 1000 square feet, as revealed where the line crosses column B.

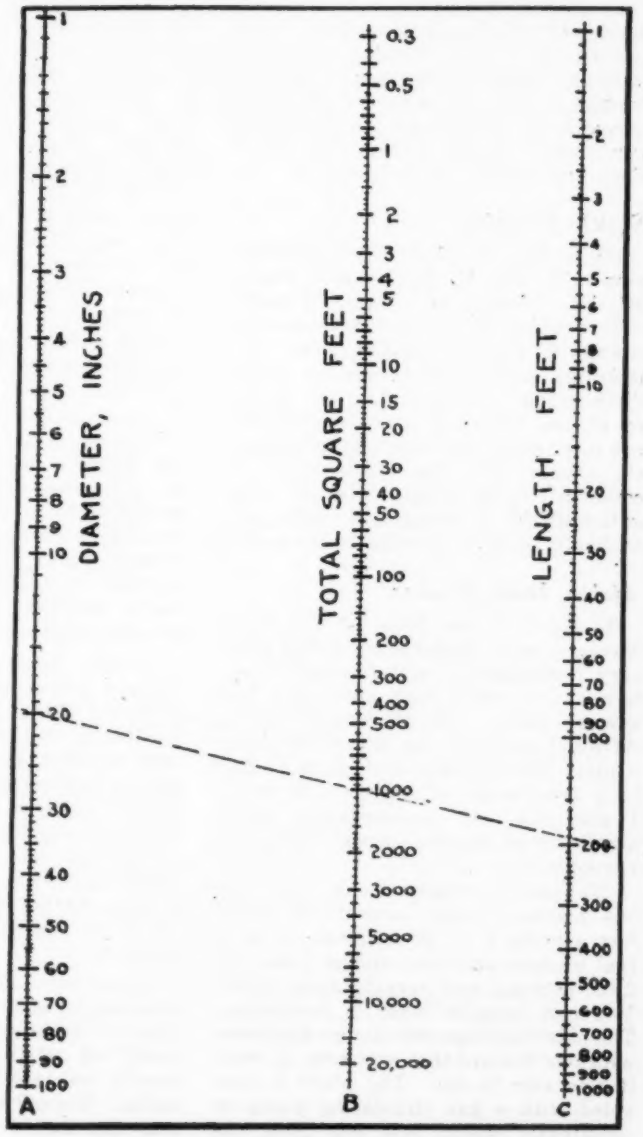
The chart covers a wide range—from 1 to 100 inches in diameter and from 1 to 1000 ft. length. But it can be applied to any diameter or length, as follows: Let us suppose that you want to build a vertical tank of any material, 200 inches in diameter and 191 ft. high. What will be the area? Those figures have been chosen purposely to show that the same dotted line already drawn across this chart can be used to solve the problem. The answer will be 10,000 sq. ft. instead of 1000 sq. ft. for reasons that are obvious.

In other words, if you add a cipher to the figures in column A you must also add a cipher to the answer in column B. If you add 2 ciphers in column A you also add 2 ciphers in B. And so on. The same is true of column C. To make sure that everything is understood let us add 2 ciphers to the 20 in column A, making the diameter 2,000 inches. And let us add 2 ciphers to the 191 in C making the height 19,100 feet. The number of square feet will then be 10,000,000 because we must add a total of 4 ciphers to the figure in column B.

Of course the last example was just to illustrate the wide range of such a small chart if one considers the multiples of 10 or 100 involved and multiples the figure in Column B accordingly. In this case we had $100 \times 20$ inches and $100 \times 191$ feet, so we simply multiplied the 1000 sq. ft. figure by 100 to take care of the 100 diameters and the resulting figure is then multiplied by 100 to take care of the 100 heights or lengths; i.e.—$1000 \times 100 = 100{,}000$ and the $100{,}000 \times 100 = 10{,}000{,}000$.

Now if the diameter is 200 inches and the height is only 19.1 feet the line crosses Col. B at 100 sq. ft., so multiply only by 10 diameters ($10 \times 20$) and the surface area of this tank or standpipe is found to be the same 1000 sq. ft. as that of the 20 inch cylinder 191 ft. high or long.

The chart may be also used to determine the most economical ratio of diameter to height for tanks of required volume—i.e., the diameter and height combination which gives the least number of square feet of surface area is the most economical in materials of construction. In short, the chart may be used "backwards" as well as "forward" and for several purposes.




Cylindrical Surface Area Chart

# SEWAGE DISPOSAL AROUND THE WORLD

IN THE absence of a regular spring meeting, the New York State Sewage Works Association is depending on section meetings and its News Letter to fill the gap.

The current issue of *News Broadcast from Station NYSSWA* (June), features under the heading "Sewage Disposal Around the World", letters from several members stationed at various parts of the Globe. Extracts from these letters should have a wider audience than the 500 plus members of NYSSWA and we therefore reproduce them in part here.

For example, Col. W. A. "Bill" Hardenbergh, Director of the Sanitary Engineering Div. of the Office of the Surgeon General wrote:

"Where we have been established, as in Hawaii and Panama, and in our permanent bases as Newfoundland, Trinidad, etc., we have done fairly well. Our installations at Dakar, Casablanca, etc., are certainly not permanent so far as we know now, and we do not feel that local sanitary levels justify the use of shipping space and labor to follow American standards. Instead, we have adopted measures adequate to safeguard the health of our troops according to local conditions and have let it go at that."

### *South America*

Capt. Stan Barker, CEC (USNR) now with the U. S. Naval Aviation Mission, Lima, Peru, says, "Practically speaking, there is no treatment of sewage in Peru. Possibly, some communities settle part of sewage before discharging it into irrigation ditches or stream beds but such communities are few and far between and, generally, the sewage, when there are sewers, is conducted to the nearest acequia (irrigation ditch) or stream bed (which will probably be dry 6 months in the year).

### *Africa, Italy, France*

To Paris to hear from Lt. Col. R. C. Sweeney, now stationed at Allied Military Headquarters with General Eisenhower. "I really have seen very few sewage plants. In all French North Africa, I saw just one municipal plant, a plain settling tank and contact filter in a town south of Algiers. In Italy, I also saw one sedimentation plant, northeast of Naples—it was being bypassed.

"To date in France I have seen but one plant—a large institutional plant now serving a U. S. hospital. It is a real modern activated sludge plant for 2,200 persons, now serving about 5,500. You can imagine what is happening. The plant has separate sludge digestion, with one feature that was new, at least it was new to me. The plant is provided with a gas circulating pump or compressor which took gas from the top of the digester and pumped it back into the bottom to provide for mixing and stirring of the contents.

"None of the large cities where I have spent most of my time, Algiers, Naples, Marseilles, Dijon, or Nancy have had treatment plants. Paris, of course does have a number of plants and disposal arrangements ranging from sedimentation with disposal on land to relatively new activated sludge plants."

This page was prepared originally for our July issue. Because of the paper use restrictions at the time, and since, it could not be used. Since these restrictions have been eased somewhat, and thinking this item still of interest, we have pulled it from the well known pigeon-hole for use in this issue.

### *Sewage Disposal in the Near Arctic*

Capt. Joe Salvato, Jr., writes of sewage disposal in the colder regions:

"Sewage disposal in Northwestern Canada and Southeastern Alaska, adjoining the Alaska Highway and tributary roads, was dictated by military expediency and climate. An indication of the climate in this area: the maximum temperature recorded at the Dawson City Meteorological Station, which is located just above the 64th Parallel in the Klondike gold fields 100 miles northeast of the Alaska Highway, was 92 degrees above zero and the minimum 68 degrees below zero. Average precipitation was 12.8 inches per year.

"The temporary methods used by the Army for the disposal of sewage were patterned after the local practices. These consisted of the old reliable pit privy, the removable pail type privy, and cesspools or collecting tanks. Where the privy was used, it was found desirable to insulate and heat the structure to encourage its use at times of extreme cold. This proved so successful that it became a routine matter to check the privies when looking for missing personnel on work details.

"Where possible sewage was discharged into a large stream, either directly or through a settling tank, depending upon local conditions. During cold weather the contents from pail privies and cesspools were collected in heated enclosed tank carts, 'Honey Wagons', and were discharged to large streams or lakes not used for water supply. When water courses were frozen, wastes were deposited on the ice to be washed away in the Spring breakup.

"More permanent methods of sewage disposal, in addition to improved variations of the units mentioned above, consisted of settling tanks (referred to locally as septic tanks), and Imhoff tanks. The effluent from settling tanks was distributed to absorption fields by means of improvised wooden box sections, agricultural tile, bell and spigot terra cotta pipe, 'blind ditches' or 'french drains,' depending upon the materials which happened to be available.

### *And to the Hot Regions*

The following description is anonymous but most interesting:

"We entered Guadalcanal very early in the operation. The place was in a very primitive stage and to throw in several thousand men at one time created a bit of a problem.

"This problem was handled with the usual military slit trenches, a dig and cover proposition except the trenches are dug by a working party for use of all hands. A shovel is left at the trench and each man that uses the trench refills with enough earth to prevent an exposed nuisance. The trenches are also known as straddle trenches as it is necessary to straddle in order to use it.

"As we became more civilized we built six and eight hole privies. The first were just the box set on a platform. Drop seat covers were fashioned from wood with pins for hinges as no strap hinges were available. After about two months we really became civilized and put a roof over the facilities and provided a screened enclosure.

"Chloride of lime was usually not available. This shortage was overcome by throwing dry coconut husks into the pit, pouring old motor oil on them and setting the place afire. Sufficient heat was developed to kill the fly larvae and we had very little fly nuisance.

"You may have read about the P.T. boats knocking down the heads along the shores of some of the islands. At Tulagi we had some of these privies on stilts over the water. They were very practical and seemed to work without maintenance or worry. Twice each day the tide carried away all deposit leaving almost no pollution on the beach. As you may well imagine one of those heads on stilts was no safe place to view the scenery when fast boats were passing. Several did collapse from the force of the waves. Many small fish frequented those places and it was interesting to see the various colors and shapes. Some were really very pretty.

### *Germany—or What Is Left of It*

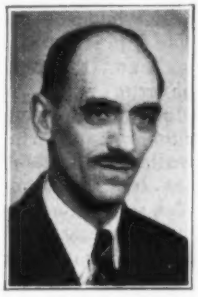
Maj. Harley M. Riley reports, "the Heinies do quite a job with sewage treatment. If ever I saw complete treatment, the Jerries have it. One popular by-product is the extensive use of the gas from the digestion plants for the operation of motor vehicles. They have elaborate bottling plants for that purpose."

With the above as a sample, we are anxiously awaiting the return of many of these and other friends and the stories they will bring back with them.

# REPLACING A DIGESTER VALVE

By ROBERT C. URBAN
Sanitary Engineer
CORPS OF ENGINEERS
FT. TOTTEN, N. Y.

REPLACING a flanged, rubber gasketed, 6-in. valve may prove quite a problem when the valve is the only one on a sludge inlet pipe into a heated floating cover digester. This particular pipe extended some inches into the digester and the valve was the only one between the digester and a plunger type sludge pump. The problem arose when this valve would not completely close. Inability to close the valve caused a hazardous and disagreeable condition whenever the sludge pump valves clogged because raw sludge flowed out during pump cleaning operations. Once, 8 inches of raw sludge flowed out onto the floor before the pump valve cap could be replaced.



The Author

There being no other valve on the line, some method of replacing it had to be found. There were two general conditions under which this valve could be replaced. One was to let the floating cover down to its stop-brackets, and then draw off 5½ feet of liquid until the sludge inlet pipe was above liquid level in the tank. Besides other problems involved, the author was very reluctant to use this method because of the potentially explosive condition that might exist in the 5½ feet of partially covered air-methane mixture. If no other method was to be found consideration would have been given to cooling the contents of the tank with ice and snow (this was in mid-winter) until the bacterial action and gas production were nil.

The other general condition under which the valve could be replaced was with a minimum of 5½ feet head of liquid in the sludge inlet line (the floating cover just resting on its brackets). A survey was made among other operators, sanitary engineers, and valve and equipment manufacturers as to methods used in similar problems. The most common method suggested was that of freezing the inlet pipe between the valve and the digester wall with solid carbon dioxide, i.e., with "dry ice." This would have prevented flow back through the inlet line. But, this method was ruled out for two reasons; because of the possibility of the ice plug slipping on a grease coating lining the pipe and because of the possibility of cracking the concrete wall where the pipe entered it, since the distance between the valve and the wall was only 14 inches and the pipe would probably have to be boxed with solid $CO_2$ for its entire length.

The use of a diving suit for making repairs inside a full digester was the most interesting and speculative of all considerations. There is the possibility that such a method might be less expensive, take less trouble and create less hazards than the emptying of a tank.

### *Use of a Plug Decided Upon*

It was realized all along that it was possible to revolve or swing the floating cover of the digester around until the manhole near the edge of the cover was directly above the sludge inlet pipe, and with the manhole cover removed insert some sort of plug into the pipe. A water bag was suggested for this operation but it was considered too difficult to find the hole and properly insert, as it is such a flexible tool. A solid plug, suggested by Phillip Goldsmith, Acting Director, New York University Sanitary Engineering Laboratory, was finally adopted. Fig. 1 shows the scheme of operation and general design of the tank.

The final decision was to use a wooden plug of a diameter slightly smaller than the inside diameter of the sludge inlet pipe, tapered at the front and backed by first a disk of sponge rubber, 1 in. thick, and then a wooden disk, 2 in. thick. These disks were of diameter greater than the outside diameter of 6-in. pipe, but small enough to fit into the bell of a 6-in. pipe (it was not known whether the end of the sludge inlet pipe was bell shaped, flanged, straight cut or rough cut). A 1-in. pipe was run through the disks and plug, and all made into a rigid assembly. This assembly, shown in Fig. 2, was attached at right angles to a pole, also a pipe. The pipe on the assembly extended about 6 inches beyond the plug and acted as a feeler. The length of the assembly pipe from the back of the wooden disk to the pole was governed

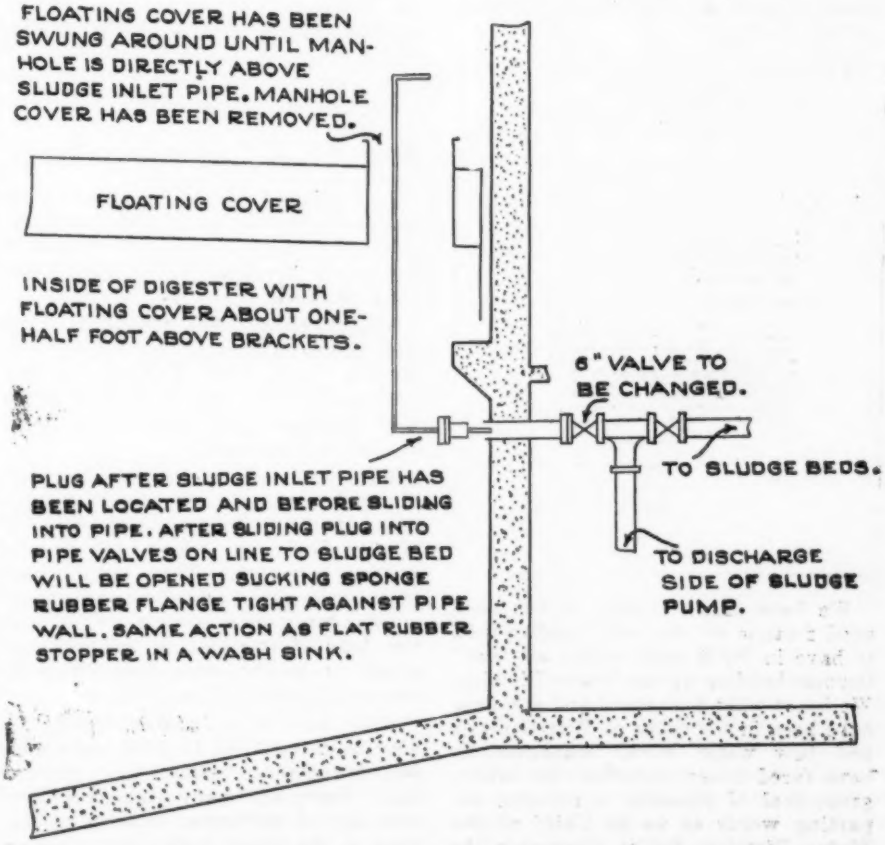
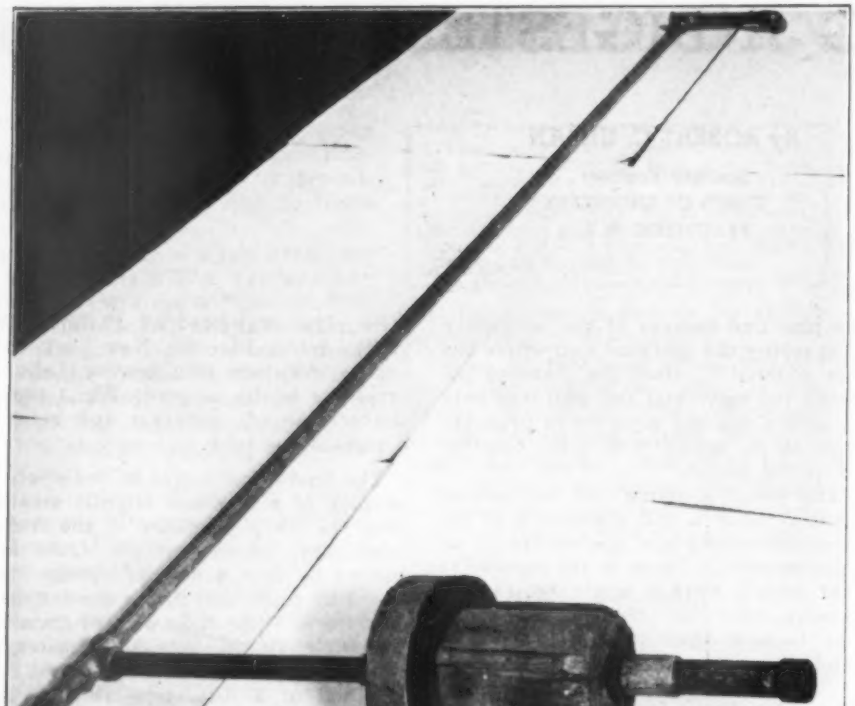

FLOATING COVER HAS BEEN SWUNG AROUND UNTIL MANHOLE IS DIRECTLY ABOVE SLUDGE INLET PIPE. MANHOLE COVER HAS BEEN REMOVED.
FLOATING COVER
INSIDE OF DIGESTER WITH FLOATING COVER ABOUT ONE-HALF FOOT ABOVE BRACKETS.
6" VALVE TO BE CHANGED.
TO SLUDGE BEDS.
PLUG AFTER SLUDGE INLET PIPE HAS BEEN LOCATED AND BEFORE SLIDING INTO PIPE. AFTER SLIDING PLUG INTO PIPE VALVES ON LINE TO SLUDGE BED WILL BE OPENED SUCKING SPONGE RUBBER FLANGE TIGHT AGAINST PIPE WALL. SAME ACTION AS FLAT RUBBER STOPPER IN A WASH SINK.
TO DISCHARGE SIDE OF SLUDGE PUMP.

Fig. 1. General Scheme of the Problem and Its Solution



*(Photo by U. S. Army Signal Corps)*

**Fig. 2. Plug with Pole Attached**

by the distance of the edge of the manhole to the inside of the digester wall.

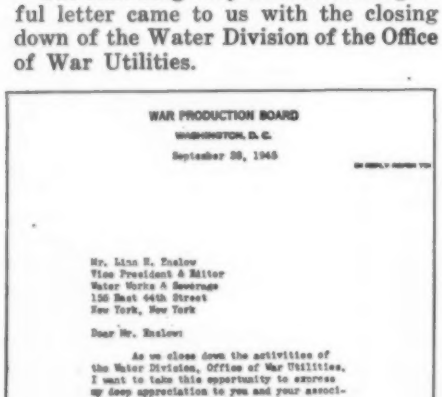
On commencing the plugging operation the floating cover was dropped to within one half foot of its brackets in order to use a short pole for easier manipulation. Although the piping in the digester (hot water inlet, hot water return, gas, etc.) had been previously charted as close as possible, this maze of pipes was such that it took a full hour to make the original insertion of the plug.

After the pipe was located the plug was inserted easily but it would not suck-in and close the flow completely after the line to the sludge beds was opened. It was eventually discovered that when the plug was inserted there was a horizontal pipe between the tank wall and the pole of the plugging apparatus which prevented moving the plug in far enough so that the sponge rubber made firm contact with the pipe walls. This was corrected by increasing the length of pipe between the wood disk and the pole. The next try was quite successful and not a drop of liquid came through the line during the changing of the valve.

When the new valve was opened and the pump started the plug was easily removed.—And another cause of headaches had been solved in a simple manner.

## It Was a Privilege

The following very kind and thoughtful letter came to us with the closing down of the Water Division of the Office of War Utilities.



WAR PRODUCTION BOARD

WASHINGTON, D. C.

September 28, 1945

Mr. Linn H. Enslow
Vice President & Editor
Water Works & Sewerage
156 East 44th Street
New York, New York

Dear Mr. Enslow:

As we close down the activities of the Water Division, Office of War Utilities, I want to take this opportunity to express my deep appreciation to you and your associates in Water Works and Sewerage for the excellent cooperation received in support of the wartime programs and policies which the Division carried out in serving the water utility industry.

Sincerely,

Arthur B. Gorman
Director, Water Division
Office of War Utilities

We have often thought of the very good fortune of the water utility field to have in WPB such a man as "Art" Gorman heading up the Water Division. We know what his record and standing have been in the Office of War Utilities and how water works managements have fared under his office. We take a great deal of pleasure in printing his parting words to us as Chief of the Water Division, for it illustrates the consideration and thoughtfulness of the effective executive that "Art" Gorman proved himself to be under wartime pressure and strain. Some day we hope to see some special medals struck for the Gormans who served the country so ably and well in Washington during World War II.

## New A.S.A. List of Standards

A new list of all American Standards and War Standards is now available free of charge from the American Standards Association, 70 East 45th St., New York 17, N. Y.

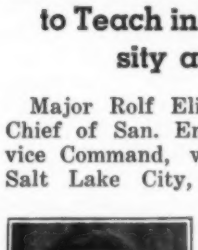
Approximately 800 standards (and their prices) are listed in 15 categories running from Civil Engineering and Construction to Commercial Standards. War Standards and Safety Standards are listed separately.

The constitution of the ASA has been changed to remove the present restrictions limiting the work of ASA to "those fields in which engineering methods apply". The organization will now be able to handle any standard or standardization project which is in the field of engineering, or consumer goods, or in any other field which deserves national recognition.

This list of standards, ASA No. 4501, is dated April 15, 1945 and should be obtained to replace any previous list. There are many standards listed that are of particular interest to persons in the water works and sewerage field.

## Rolf Eliassen Sent Overseas to Teach in Army University at Biarritz

Major Rolf Eliassen, until recently Chief of San. Eng. Section, 9th Service Command, with headquarters at Salt Lake City, recently sailed for Biarritz, France, to join the faculty of the U. S. Army's G.I. University located at this famed seaside playground on the Mediterranian.



**Major Eliassen**

The University at Biarritz is one of several which the Army is establishing overseas for our soldiers of occupation who are prevented from returning home. It is understood that full accredited university courses will be offered those soldiers who can qualify for entrance.

It is expected that Major Eliassen will be stationed at the University in Biarritz for the next year and will develop courses in San. Engineering. Dean Thorndyke Saville probably won't be too enthusiastic about this particular honor which has come Prof. Eliassen's way. Fact is, we wager that the Dean would give a pretty penny to be able to trade places with Major Eliassen because Biarritz on the French Riviera can't be too hard to take.

# STRAIGHT FROM OUR READERS

## What They Tell Us and What They Ask About—

# SLUDGE HANDLING

*From personal interviews, Water Works and Sewerage is learning the thoughts, likes, dislikes, problems and questions of its readers. Because we believe other readers will be interested in the problems, questions and comments of various superintendents, engineers, chemists, operators, and consultants in the field of water purification and sewage disposal, we shall publish these comments whenever space permits.*

*Each feature page will consist of quoted statements taken from various interview reports. In several cases the particular topic may require more than one issue for the material on hand.*

*If you have not yet been interviewed, and have any thoughts on these subjects, we shall be pleased to receive your comments by mail for publication in future issues.*

### *Barging vs. Centrifuging*

"We find it more economical to dispose of the sludge by taking out to sea on barges. This way it costs us only 33 cents per ton. With the plain sedimentation we are able to concentrate the solids to 9 per cent. Sometime ago a stock company set up a centrifuge plant to dewater the sludge so it could be incinerated. They operated on a contract basis which included paying us a forfeit if they couldn't handle a certain volume each month. They couldn't do it, and for a while they were really Santa Claus to us. They gave up and left the plant. The machinery is still here."

### *Grease Removal and Supernatant Liquor*

"Two of the problems in sewage treatment I'd like to see licked in the post-war period, are: first a really successful way of removing grease from the surface of tanks plus a way of its utilization for fats and glycerine; second, a good way of decanting liquors from the digesters."

### *Sludge Dewatering*

"The sewage field as a whole can stand plenty of improvement but one of the most pressing of present day problems is that of sludge dewatering. There has been some promising work on centrifuges for this treatment but they haven't licked the problem yet. Sludge is an increasing headache and it should receive more emphasis. For instance, a plant serving 70,000 people kept an itemized cost record. On breaking down the annual figures they found that they were spending as much for handling the sludge as they were for the rest of the system. This case is not singular, either. I believe if more plants broke down their operating figures they would find the same thing."

* * * *

"Dewatering the sludge is always a problem. We treat with lime and ferric chloride. When the temperature gets up fairly high in the summer we get decent results, but in the winter it is almost impossible to keep the filter running more than three or four hours because the filter cloths become blinded with carbonate of lime. It is rather difficult to experiment with anything on a plant scale and we have to look to the designers for the better separation at the filters and the better digestion of sludge that brings about a higher concentration."

### *Greenhouse Drying*

"Our sludge is dried in a greenhouse but it's a slow process because the smoke and soot from the locomotives dirty our windows. We have to clean them with an acid solution. We're right in the middle of about 4 railroads. I offered the sludge as a fertilizer at a local CVO meeting on Victory Gardens. Then the rush began. The townspeople clean it out as soon as it is dry. They come in all kinds of conveyances. I furnish them with forks and shovels and the empty alum bags and they pack it up and cart it away. There seems to be no objection to using it here and we get nothing but good reports on its effect as a fertilizer."

* * * *

"These Imhoff tanks did a good job when they were put in in 1918. On top of the fact that they are old and aren't as efficient as they used to be, they are terrifically overloaded. The normal population has doubled since they were put in and a lot of war workers have moved into this section. The sludge is fed by gravity to the drying beds. While this eliminates pumping, it's not very good in the winter because we have to shut down for fear of freezing the exposed pipes. We dry in that greenhouse. It's falling apart as you can see. We don't bother to replace glass or maintain it in any way. We'll just wait until the new plant is installed."

* * * *

"We draw off our digesters in July. That's the only time that the sludge is ripe enough to take off. If we tried to take it off any other time it would stink up the whole neighborhood and we'd get a lot of complaints.

"We dry it in those two greenhouses. The people in the town have been taking it as soon as it is dry, but the demand seems to have slacked off now and I guess we'll have to use it for land fill. It takes a long time to dry. First of all, because the digester doesn't dewater it very well and secondly, because we have a hard time keeping windows in the greenhouse. What we need there is an unbreakable glass."

* * * *

"We could use an addition to our greenhouse. The sludge dries so slowly in the winter time that it piles up in there. However, we're not spending any money on the plant until the war is over."

### *Open Bed Drying and Land Fill*

"The sludge coming out of the Imhoff tanks isn't bad. We dry it in open beds and experience no odor complaints. It's all a question of keeping your beds clean. After drying, we use it mostly for land fill. We had it tested once or twice and it was judged safe to use but we only use it on lawns or mix it with leaf mold and use it in the parks."

### *Screenings Disposal*

"All the screenings are dumped into two concrete pits. When they get full enough, we have a crane come along and load the stuff on trucks which take it to the city dump. If you put the screenings above the water line, they disintegrate much better than when put below. In digging the foundation for the garbage incinerator, we found some sludge that had been dumped below the water line years ago still in its original condition, but on checking the stuff that had been put above the water line, we found it well disintegrated. I think that the porous nature of the ash heap into which we dump it allows the bacteria to work better. I would like to have a better way of handling these screenings because they cost us quite a bit to haul now, but that's a major

plant change that involves designing and we'll have to wait until after the war before we can consider it."

* * * *

I wish someone would build a really good roll press. The one we have just does a fair job. It has a rubber roller and some of the screenings come through too wet, fall off the belt and go back into the sewage. The best it can do is to take out 25 per cent to 30 per cent of the moisture. With a press that could remove more moisture, we'd have less tonnage going into the incinerator and the drier material would burn much better."

### *Lagooning vs. Drying and Incineration*

"All we do with our sludge at the present time is to dump it on the meadows. However, when present restrictions are lifted, we will be interested in a dryer and incinerator. We'd prefer one machine that can do both and understand that there are some of that type on the market. Then we can either burn the sludge or just dry it in case we want to make fertilizer."

### *Raw Sludge*

"At the present time we are terrifically overloaded. Our digesters are jammed full. Ordinarily we filter the sludge solids but we can't do that now. We just settle out the raw sludge. The sludge is taken by local farmers and the townspeople come and get some of it for victory gardens. I keep telling them that it's no good because it isn't digested but they take it anyway. From what I hear, however, they get beautiful results with it."

## Sawyer Goes to M.I.T.

Clair N. Sawyer (Ph.D.), formerly director of the Wisconsin Lake Pollution Survey, and more recently special technical investigator for the South Dakota Board of Health, has been appointed associate professor of sanitary chemistry in the department of civil and sanitary engineering at the Massachusetts Institute of Technology.

Dr. Clair N. Sawyer

The appointment of Dr. Sawyer is part of the plan to expand the program in sanitary engineering to meet the anticipated post-war demand for sanitary engineers. He will be concerned with the teaching of the operational phases of sanitary engineering including sanitary chemistry, water analysis, and fundamental research in water, sewage and industrial waste treatment.

A native of Wisconsin, Dr. Sawyer took his undergraduate training at the University of Wisconsin, receiving the degree of bachelor of science in chemistry in 1930. At the University of Colorado he earned his master's degree in Sanitary Chemistry in 1936, and in 1938 he received the degree of doctor of philosophy from his Alma Mater, the University of Wisconsin. For two years (1940-1942) he taught sanitary chemistry and biology at New York University, leaving to take charge of Wisconsin's Lake Pollution Survey on special assignment.

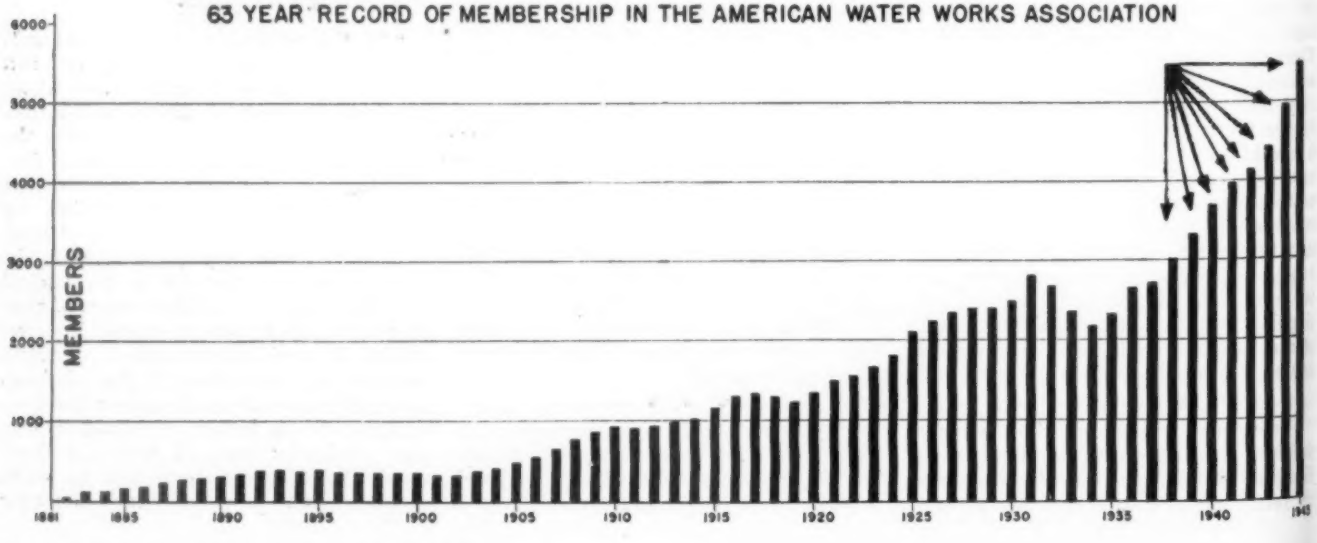
## Determination of Fluoride in Water Simplified

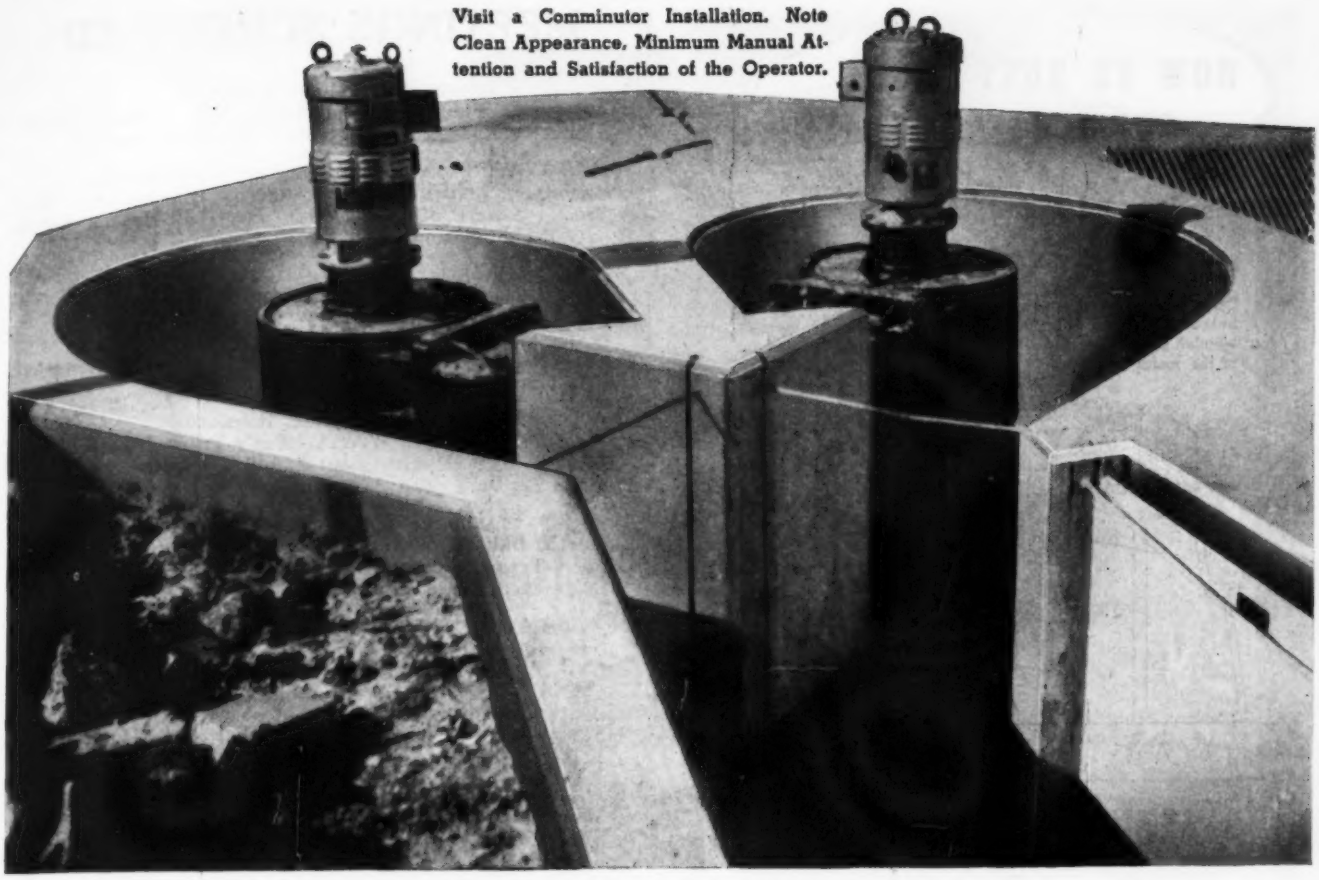
A convenient, rapid colorimetric procedure for the *Determination of Fluoride in Water*, has been published by William Lamar, Geological Survey, U.S. Dept. of Interior, in the March 1945 issue of *Ind. and Engr. Chem., Anal. Edition*. The method uses zirconium-alizarin indicator acidified with sulfuric acid, which makes the indicator stable indefinitely. The sulfuric acid also makes possible the maximum suppression of the interference of sulfates. Control of the pH of the samples eliminates errors due to alkalinity. The fluoride content of waters containing less than 500 ppm. of sulfate and less than 1000 ppm. of chloride may be determined within a limit of 0.1 ppm. when a 100 ml. sample is used. The determination is made in 100 ml. Nessler tubes.

## AWWA'S 63-YEAR GROWTH

Writing in the May issue of the *Taste and Odor Control Journal*, published by Industrial Chemical Sales Division, Samuel F. Newkirk, Jr., President of the American Water Works Association, presents the accompanying graph to show the growth of AWWA since 1881. For the conspicuous record since 1937, represented by the last eight bars in the graph, Mr. Newkirk praises the work of Harry E. Jordan, so instrumental in the doubling of the membership in these eight years of service as Executive Secretary, and asks that members continue their efforts to bring in more members as the Association goes into the post-war years.

[We would add that in the present year of cancellation of the National Convention, and the curtailment of sectional meetings, AWWA's membership growth is showing the effects of the lacking stimulus of meetings. It is, therefore, more important this year than ever before for members to "sell" the Association to prospective members and maintain the growth curve.—Editor.]





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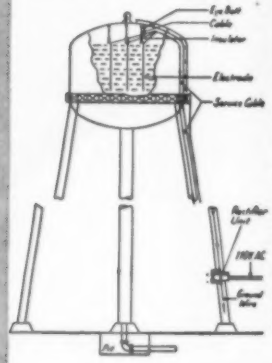

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# MEETINGS SCHEDULED

Nov. 4-6—CHICAGO, ILL. (Hotel Sherman)
**American Public Works Association.** Exec.-Director, Frederick Bass, 1313 East 60th Street, Chicago, Ill.

Nov. 5-6—WINDSOR, ONT. (Hotel Prince Edward)
**Canadian Institute on Sewage & Sanitation.** Sec'y Treas., Albert E. Berry, Ont. Dept. of Health, Parliament Bldg., Toronto, Ontario.

Nov. 5-7—CHARLOTTE, N. C. (Hotel Charlotte)
(Joint Meeting)
**North Carolina Section A.W.W.A.**
**N. C. Sewage Works Assn.**
Sec'y, D. M. Williams, Supt. of Water & Sewerage, Durham, N. C.

Nov. 8-9—ROANOKE, VA. (Hotel Roanoke)
**Virginia Section A.W.W.A.** Sec'y-Treas., W. H. Shewbridge, State Health Dept., 1506 Greycourt Ave., Richmond 22, Va.

Nov. 8-9—FARGO, N. D. (Gardner Hotel)
**North Dakota Water and Sewage Works Conference.** Sec'y-Treas., Jerome H. Svore, State Sanitary Engr., State Health Dept., Bismarck, N. D.

Nov. 9—ATLANTIC CITY, N. J. (Hotel Madison)
**New Jersey Section A.W.W.A.** (Fall Meeting.) Sec'y, C. B. Tygert, Box 178, Newark, N. J.
(Joint meeting with)
**South Jersey Association of Water Superintendents.** Sec'y, Walter Spencer, 2707 Bethel Ave., Merchantville, N. J.

Nov. 13-15—MILWAUKEE, WIS. (Pfister Hotel)
**Wisconsin Section A.W.W.A.** Sec'y-Treas., Leon A. Smith, Supt. Water Works, City Hall, Madison 5, Wis.

Nov. 15-16—WHEELING, W. VA. (Windsor Hotel)
**West Virginia Section A.W.W.A.** Sec'y-Treas., J. B. Harrington, State Dept. of Health, Charleston 5, W. Va.


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NSA Aurora Centrifugal Sump Pump

Aurora Deep Well Turbines for all conditions—4" to 24"

Type AD Hor. Split Case, Two Stage Centrifugal



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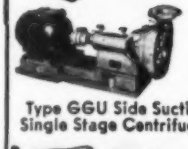
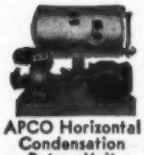
Type G M C Close-Coupled Centrifugal

**Apco Turbine-Type Pumps** The simplest of all pumps. Ideal for small capacity, high head duties. Silent, compact and lasting.



Type GGU Side Suction Single Stage Centrifugal



APCO Horizontal Condensation Return Unit

APCO Single Stage Turbine-Type

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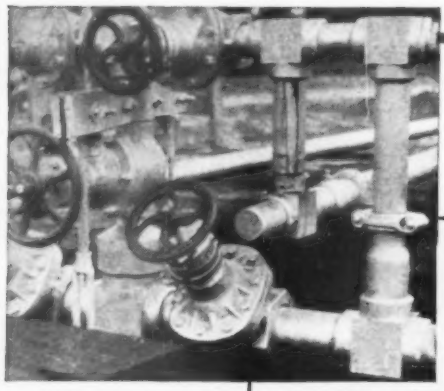
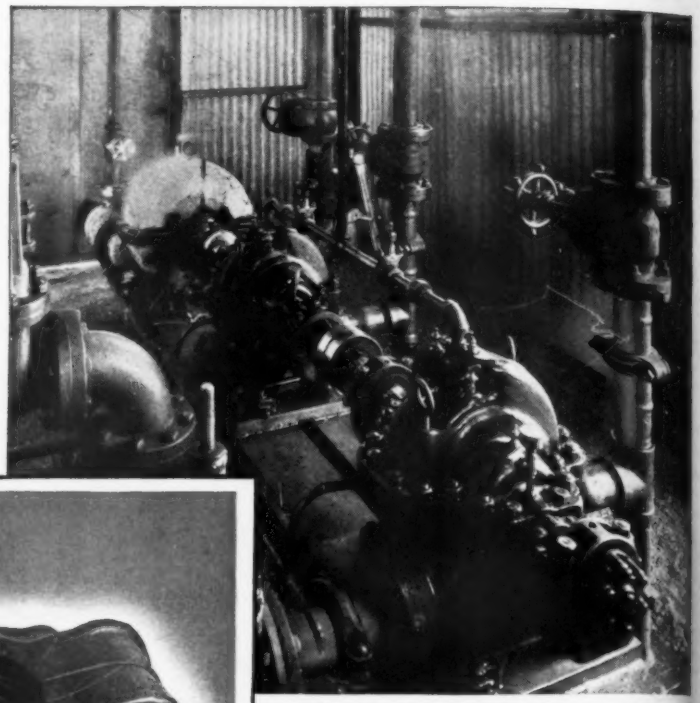
# Climax Flexible Lock Coupling ABSORBS VIBRATION

***...protects valve and instrument settings. Prevents leaky connections in piping installations!***



▪ *Climax Coupling on high pressure line. Compare leak-proof performance of coupling with leaky drop forge fitting at left.*



▪ *Piping and valves in this pump installation are effectively "insulated" from vibration by flexible, leak-proof Climax Couplings. Also, valve may be disassembled from line by removing bolts from* ONLY ONE *flange. Exclusive design features make Climax Couplings 100% satisfactory in service with steam, water, air, gasoline, kerosene, oil or gas up to 1000 lb. working pressure.*

ABSORBING VIBRATION from engines, pumps and compressors is but one of innumerable industrial applications in which Climax Flexible Lock Couplings have proved their superiority.

On high pressure lines—on all piping installations, above and under ground or under water, indoors or outdoors—wherever piping is subject to expansion or contraction from changing temperatures—wherever settling of tanks or vessels or other causes of line deflection may occur—wherever hammering may be set up by rapid opening or closing of valves—the flexibility of this coupling not only absorbs the vibrations and allows for deflection (up to 5 degrees at each coupled point), but also provides a positive permanent *pressure and vacuum tight seal* more enduring than the pipe itself.

With Climax Couplings, costly *threaded pipe and fittings* are eliminated. Connecting-up and disassembly are easy and quick. Money is saved on installations, labor—on material, maintenance and replacement expense.

**FOR COMPLETE DETAILS** write for Bulletin No. 130. McAlear Manufacturing Co., Automatic Control Division of Climax Industries, 41 N. Cincinnati St., Tulsa, Okla.

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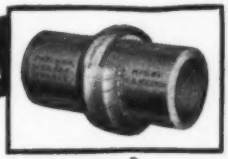
# MANUFACTURERS' and EQUIPMENT NEWS

## Diamonds to Her Mean Cast Iron Pipe

"Dot" Graveley, Checker

In Lynchburg Foundry Co.'s estimable magazine, "The Iron Worker," the above picture caught our eye. Cast iron pipe and fittings and work in a foundry always seemed to us heavy and rough work. Little did we ever expect to see a comely lass all so spick and span taking over for


WESTON



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- No jute used—gasket centers spigot.
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- Form confines cement-grout to lower portion of joint.
- Particularly advantageous in water-bearing trenches.
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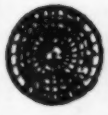
FOR SEWAGE TREATMENT AND WATER SUPPLY . . .



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Each job is individual—carefully worked out in every detail. Norwood Filters remove pollution and foreign matter from water, and may be combined with aeration and automatic chemical treatment to correct objectionable odors, color, organic or mineral content.

Consulting, municipal or industrial engineers are invited to write for further information on any water treatment problem.

W-3

*New buildings housing Norwood Filters and Operating Floor at American Brass Co., Ansonia, Conn.*

**The NORWOOD**
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The Best For Your Money
NORWOOD FILTERS
In The Long Run

men at war in a foundry, so here was a picture that spelled NEWS to us.

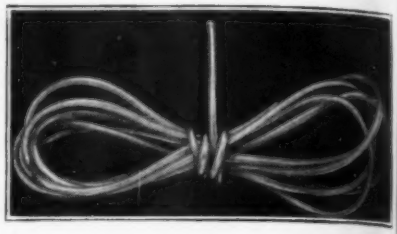
During the war Mrs. Dorothy Graveley left the office to take over a job as stock-checker in the yards of Lynchburg Foundry Co. Here she is on the job until Lynchburg's men return from the wars. To her diamonds now mean Cast Iron pipe and fittings, for each piece she checks bears Lynchburg's trade mark—a beaded diamond containing the letters LFC.

## Eben Lufkin Represents Varec in New England

Eben P. Lufkin of the Lufkin Engineering and Equipment Co., 368 Congress St., Boston, Mass., has told us that his firm is now the New England representative of the Vapor Recovery Systems Co. (Compton, Calif.) and will henceforth be handling the "Varec" equipment, including pressure and vacuum relief valves with flame arresters.

## New Type Plastic Tubing

Fisher Scientific Co. has announced a new product, a type of plastic tubing which is practically as flexible as rubber tubing and has much more resiliency than the earlier plastic tubing. This new tubing, called "Plastubing," does not require short lengths of natural rubber tubing for connections to laboratory apparatus; it has no tendency to split when pushed onto a serrated connection.



Plastubing will serve about 90 per cent of the ordinary laboratory uses where rubber tubing has been used and is even suitable for permanent installations; in one instance, Plastubing of 3/8 in. bore and 1/16 in. wall delivered compressed air at 60 psi. without the connection being broken.

Plastubing is made from the copolymer of vinyl chloride and vinyl acetate, is non-inflammable, more abrasive-resistant than rubber, is non-oxidizing, has good resistance to continuous flexing, resistance to chemical action, and good dimensional stability and tensile strength.

Fisher Plastubing is light amber in color and semi-transparent and comes in four sizes: 3/16 in. at 17c, 1/4 in. at 20c, 5/16 in. at 25c, and 3/8 in. at 29c, when purchased in 10 ft. lengths. Fisher Scientific Co. is located at 717 Forbes St., Pittsburgh, Pa.

## New Water-Service Packing

Greene, Tweed & Co. has developed Palmetto Plaited Packing, a new packing with long-fibre asbestos yarn instead of cotton, with the advantage that the packing can be used for hot water as well as cold water. The lubricant is Palmetto Graphite grease, applied by a process which thoroughly impregnates every individual fibre of the packing. As a result, the packing is protected from water-logging and disintegration, and its service life is greatly prolonged.

The packing is plaited in square form and is made in a wide range of sizes. Equipment for which this

packing is recommended includes centrifugal pump shafts, reciprocating pump rods and plungers, valves, fire hydrants, and other apparatus handling hot or cold water.

Further information on this new water-resistant packing may be obtained by addressing Greene, Tweed & Co., Bronx Blvd. at 238th St., New York 66, N. Y.

## Arnold Brown Becomes Manager of F-M's Pump Division

Robert H. Morse, Jr., Vice President and General Sales Manager of Fairbanks, Morse & Co., has announced the appointment of Arnold G. Brown, formerly assistant manager of F-M's Pump Division, to succeed John S. King as manager of that division.

Mr. Brown was General Sales Manager of the Pomona Pump Co. when it was purchased a year ago by Fairbanks, Morse & Co. Soon after


HYDRO-TITE

HYDRO-TITE — The self-caulking joint compound that makes cast iron water pipe joints — strong — tight — flexible and everlasting. Used on thousands of miles of pipe with a record of more than 30 years without a failure.

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FIBREX — The sanitary paper packing that is used like braided jute. Free from bacteria — treated with a water repellent — put up in 60 pound reels. 70 pounds of Fibrex takes the place of 100 pounds of braided jute.

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DRY BRAIDED
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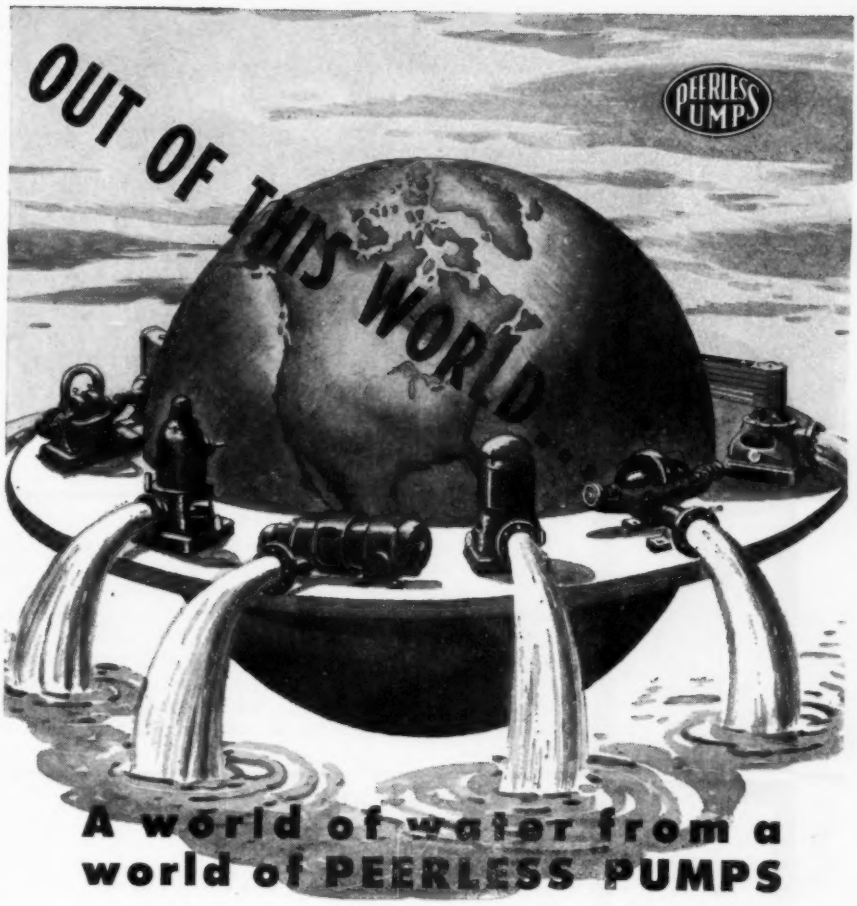



A world of water from a world of PEERLESS PUMPS

The tremendous Peerless water production has attained world-wide significance. Now offering the most complete line of vertical and horizontal pumps, Peerless can supply the exact type of pump best engineered for your well. If you are planning to "step up" your water supply, consult with Peerless. You will benefit by new Peerless developments—increased precision, design improvements and enlarged field service. With the recent acquisition of Dayton-Dowd Company, Peerless now offers horizontal pumps of practically every type.

*Peerless capacities—10 to 220,000 g.p.m.*

**Two improved Domestic Systems: Peerless Water King and Jet**

Peerless is producing the two most outstanding domestic pumping systems—the Peerless *Water King* Pumping System, for shallow wells and the improved Peerless *Jet* Water System for deep or shallow wells. Both systems are 100% automatic. *Water King*—up to 1300 gallons per hour; *Jet* up to 5000 gallons per hour.

*Peerless Distributors and Direct Factory Representatives are located in every State. Ask for name of Distributor nearest you.*

PEERLESS PUMPS

PEERLESS PUMP DIVISION
Food Machinery Corp.

FACTORIES
LOS ANGELES 31, CALIFORNIA
301 West Avenue Twenty-six
QUINCY, ILL. • CANTON 6, OHIO

# OMEGA
## *Chemical Feeders*
## A COMPLETE LINE

**UNIVERSAL**

The illustration shows a Universal Feeder with lead lined dissolving chamber, stainless steel high speed mixer, and Rotameter on water supply. These accessories are recommended for feeding Ferrisul, Ferrifloc and low grade alum. Included also, is a bucket elevator for use where overhead storage is not available. Note low and high level controls on feeder and elevator housings. Dust remover makes hopper charging a completely dustless operation. Complete chemical feeding systems are engineered and built to fit the job.

**LOSS-IN-WEIGHT TYPE GRAVIMETRIC**

This is without a doubt the most accurate type chemical feeder made. Indicates the weight of material in the hopper at all times on the scale beam. Feeds lump, granular or powdered materials at 100 different rates by increments of 1% of the maximum rate of feed. No calibration is required. The rate of feed is automatically controlled by the loss in weight in the hopper of material. Records every pound of material delivered by the feeder on a mechanical counter geared to the lead screw which retracts the counterpoise.

The size No. 1 feeder illustrated feeds up to 2000 pounds per hour.

**PRECISION SOLUTION FEEDER**

Not an orifice feeder but a true Volumetric feeder of the most accurate type for feeding solutions of Ferric Chloride, Calgon, Hypochlorite, Copper-Sulphate, Ammonium Sulphate, etc. Feeding range, 100 to 1, from 1/25 to 200 gallons per hour. Standard tank sizes, 25 to 200 gallons. Where electricity is not available, eight-day spring motors are used; meter-paced control is easily accomplished for flow proportional feeding.

**ROTODIP FEEDER**

For feeding from large supply tanks which may be located at a distance from the feeder. This cut-away view shows the metering wheel discharging into the receiving box at a high rate. Feeding range, 1 to 800 gallons per hour. Variable speed drive gives an infinite number of speed changes from zero to maximum. Liquid feeders and dry feeders may be accurately synchronized to make up fixed strength solutions or suspensions including ferric chloride.

***Bulletins on request***

*Sincerely*

**OMEGA MACHINE COMPANY**

(Division of Builders Iron Foundry)

10 CODDING ST. PROVIDENCE 1, R. I.


he was made assistant manager of F-M's Pump Division.

A graduate engineer (University of Syracuse, 1929), Mr. Brown traveled extensively as an engineer until 1937, when he went with the Pomona Pump Co. as a junior engineer in the sales engineering department. Later he became Southeastern Manager for Pomona, and at the beginning of the war was moved to New York and Philadelphia, where he was in charge of the firm's government procurement contracts. In 1943 he was appointed assistant sales manager and became General Sales Manager just before Pomona Pump Co. was purchased by Fairbanks-Morse.

## New American Well Works Equipment

With bulletins not yet available to describe the new equipment, we are in receipt of an advance announcement of four new equipment items of the American Well Works, of Aurora, Ill. The new items include a Circular Clarifier of Primary Type featuring a central influent well, rotary sludge collector, and scum skimmer, box and baffle; a Circular Clarifier of secondary type with central

**DON'T DIG THEM UP!**

Winter is a poor time to have to dig up troublesome service connections. It is a lot easier to forestall trouble by installing MUELLER Brass Goods. MUELLER Stops are the cumulative result of 87 years of experience in the water works field. Properly designed, sturdily made, these stops will resist the usual ravages of time for years as can be proved by thousands of satisfied customers.

H-10201
CURB STOP

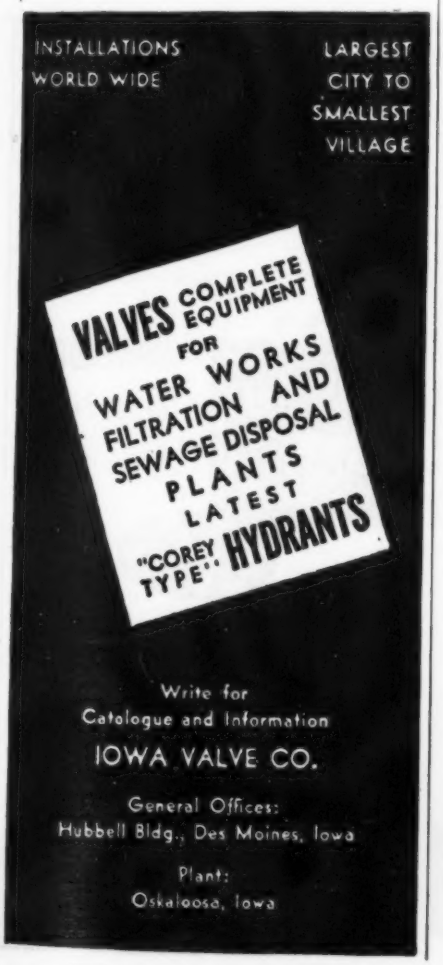
**MUELLER CO.**
DECATUR, ILL.

effluent trough; a Spiral Cross Collector for Sludge Collection in rectangular settling tanks; and a Mechanical Unit Screen consisting of a mechanically cleaned screen and screenings grinder. If you desire further information on these items, write to J. D. Walker, American Well Works, Inc., Aurora, Ill.

## "Bob" Quinn to Head Mathieson S.E. Territory

R. J. Quinn, Assistant to the Vice President-Director of Sales, of the Mathieson Alkali Works, in New York City has been named District Sales manager in the new southeastern territory for the company. "Bob", who has been active in the water and sewage field for many years, is also President of the Compressed Gas Manufacturers' Association.

R. J. Quinn



INSTALLATIONS WORLD WIDE
LARGEST CITY TO SMALLEST VILLAGE
VALVES COMPLETE EQUIPMENT FOR WATER WORKS FILTRATION AND SEWAGE DISPOSAL PLANTS
LATEST "COREY TYPE" HYDRANTS
Write for Catalogue and Information
IOWA VALVE CO.
General Offices:
Hubbell Bldg., Des Moines, Iowa
Plant:
Oskaloosa, Iowa

IT'S TIME TO *Design*

FOR LOW CHEMICAL COSTS

Plants now under construction and many still in the blueprint stage look to economies in water treatment by designing for the N-Sol Processes of water coagulation. Their choice is based on the high quality water produced by N-Sol Processes plus these definite savings:

1. Time saving in settling.
2. Higher rates of filtration and longer filter runs.
3. Lower costs for coagulant chemicals.

The choice of four processes permits use with any sterilization method. Before you blueprint, know more about the N-Sol Processes. A handy data file, containing reprints and bulletins, free on request.

Four processes fit any water treatment method—save space, save money.

N-Sol-A*—N Brand reacted with ammonium sulfate. Used where chloramine sterilization is desired.

N-Sol-B—N Brand reacted with alum. Used with any sterilization procedure. (U. S. Pat. No. 2,310,009)

N-Sol-C*—N Brand reacted with chlorine. Used with any chlorine sterilization.

Baylis Sol—N Brand reacted with sulphuric acid. Used with any sterilization procedure. (U. S. Pat. No. 2,217,466)

* Patent Applied For.

N-SOL PROCESSES FOR WATER COAGULATION

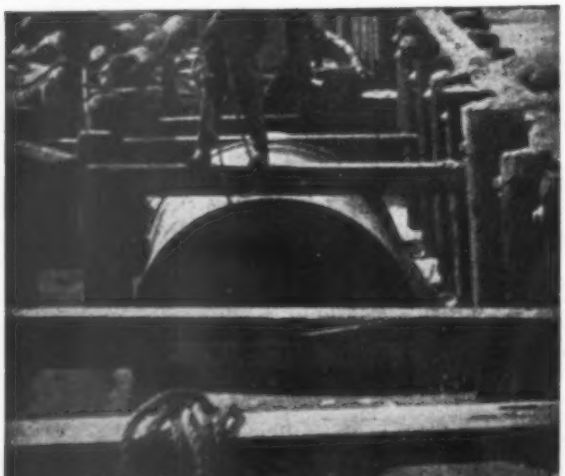
DEVELOPED AND PATENTED BY
PHILADELPHIA QUARTZ COMPANY, PHILADELPHIA 6
AVAILABLE UNDER LICENSE WITHOUT CHARGE

OPERATING VALVES WITH DEAN OPERATING MACHINE

"Power take-off from truck motor makes short order of this otherwise laborious and time consuming job."

The above statement was made by Alan D. Drake, Director, Division of Water, Buffalo, N. Y., in an article in the April 1945 issue of Water Works and Sewerage.

**RENSSELAER VALVE CO.** **TROY, N. Y.**



84" pipe—Spring Lake, N. J.

**FLANGED PIPE**

**FLEXIBLE JOINT PIPE**

**BELL & SPIGOT PIPE**

**SPECIAL CASTINGS**

**SHORT BODY BELL & SPIGOT SPECIALS**

*Large stock enables us to make prompt shipments.*

# CAST IRON PIPE

SIZES 2" TO 84"

## Warren Foundry & Pipe Corp.

11 Broadway, New York

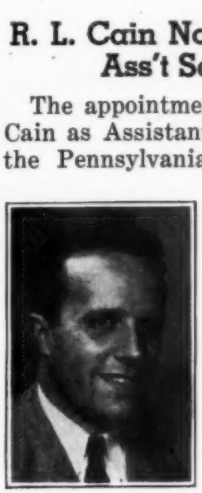
## Warren Pipe Company of Mass., Inc.

## Chicago Bridge Opens Atlanta Office

The Chicago Bridge and Iron Co. has opened a Sales Office in Atlanta, Ga. Mr. H. F. Stearns will be in charge of the new office, which is to be located in the Healey Building.

## R. L. Cain Now Penn. Salt's Ass't Sales Mgr.

The appointment of R. L. "Mike" Cain as Assistant Sales Manager of the Pennsylvania Salt Manuf. Co., Philadelphia, Pa., has been announced.



Mr. Cain attended Allegheny College at Meadville, Pa., and New York University. He joined Westvaco Chlorine Products Co. in 1936, where he was in charge of the New York district sales staff and was division sales manager of Curtin-Howe Corp., an affiliated company. In August, 1942, he joined

FOR BETTER

# pH Control and WATER TESTS

*there is nothing like*

**NON-FADING GLASS COLOR STANDARDS**

Pocket Comparator No. 605

Permanent reliability of Hellige Glass Color Standards, accuracy of color comparison, simplicity of the technique, and compactness of the apparatus are exclusive features of Hellige Comparators not found in any similar outfits.

WRITE FOR BULLETIN No. 602

# HELLIGE

INCORPORATED

3718 NORTHERN BLVD. LONG ISLAND CITY 1, N.Y.

HEADQUARTERS FOR COLORIMETRIC APPARATUS

Pennsylvania Salt Manufacturing Co. as assistant to the Director of Sales. As Assistant Sales Manager, Mr. Cain will continue his duties under Mr. Steele.

## Harlow Appointed Adv. Mgr. of Fairbanks-Morse

Lewis A. (Lew) Harlow has recently taken over the post of Manager of the Advertising Division of Fairbanks, Morse & Co., succeeding Harry Neal Baum.

It appears that Mr. Harlow began training for the position at the early age of fourteen when he was editor, typesetter, printer, etc., of his class paper at Milton Academy. Mr. Harlow graduated from Harvard in 1922 with honors, and shortly thereafter organized his own business, a publishing house for instruction manuals and textbooks for public schools.

Then during its formative years "Lew" Harlow became interested in radio and spent a number of years producing and managing programs, in addition to managing his publishing interests.

Mr. Harlow joined Fairbanks-Morse in 1943 as Asst. Adv. Mgr.


CONTACT

**LAKESIDE ENGINEERING CORPORATION**

**Chicago 6** **Illinois**

**222 West Adams St.**

FOR

**WATER SOFTENING** by the Zeolite or Lime-soda methods.

**WATER FILTERING** to remove Suspended solids, color, odor or taste.

**SEWAGE TREATMENT** by the Aero-filter which offers all of the advantages of other types of trickling filters plus better momentary distribution.

Spiraflo Clarifier for improved clarification, including scum and oil removal.



# A STAND-BY ENGINE-PUMP UNIT MIGHT PAY FOR ITSELF *in a few hours!*

BUFFALO ENGINES ASSURANCE of PROTECTION

*Buffalo Engine Model RAB-8, eight cylinder, 290 BHP at 1200 RPM driving Darling Bros. Ltd. 2-stage horizontal centrifugal pump.*

STAND-BY Engine-Pump Units powered by BUFFALO ENGINES are common in municipal water works and fire or flood protection services where their purpose is to prevent an accident from becoming a disaster.

Many industries whose processes use considerable amounts of water have the opportunity to protect themselves from the losses of production and materials in a shut-down caused by power failure. At the same time they would gain an insurance rate reduction through the extra fire protection provided. Therefore, such an installation is certain to pay for itself many times in its normal life and might some day return its cost in a few hours.

Write for descriptive bulletins, specification sheets of BUFFALO ENGINES and detailed information on any type of application which interests you. Ask for Bulletin No. 60.

## BUFFALO GASOLENE MOTOR COMPANY

**BUFFALO 13, N. Y., U. S. A.**

BUFFALO ENGINES ASSURANCE of PROTECTION

BUFFALO ENGINES — 100 H. P. THROUGH 750 H. P. — IN GENERATOR AND PUMPING SETS FOR WATER WORKS — AIRPORTS — COMMUNICATIONS — FLOOD CONTROL — HOSPITALS — INSTITUTIONS — MINES — MOVABLE BRIDGES — THEATRES — SEWAGE PLANTS.

A DEPENDABLE COMPOUND
BOND-O
FOR CAST IRON WATER MAINS

For Strength and Quick Sealing

BOND-O joints are not just ordinary compound joints. The bond is so complete that the pipe will break before the joints blow out.

Slight seepage, if any, when the water is first applied seals up as if by magic.

These strong, tight joints are the result of scientific machine blending and a desire to produce the very best.

BOND-O and BOND-O equipment must prove satisfactory. We will ship any new user sufficient material for a given extension. If after using the first few bags all claims are not justified, the remainder may be returned and full credit will be given for the entire order.

100 LBS. BOND-O (SUPER-MIX) SULPHUR CEMENT FOR MAKING TIGHT WATER MAIN JOINTS
NORTHROP & COMPANY, INC. 50 CHURCH ST. NEW YORK, N.Y.

NORTHROP & COMPANY, INC.
50 CHURCH STREET
NEW YORK 7, N. Y.

and has helped supervise the many and varied advertising activities of the company. Now he takes over the duties of advertising manager at the beginning of what promises to be an unusual and interesting era.

## Pipe and Tube Cleaning Tool

A self-contained power-driven tool for cutting and removing obstructions, stoppages, slush or scale from curved or fitted pipes, drains, tubing, sewer lines, stream risers, humidifiers, has been introduced by The Spartan Tool Co. of 6007 Lincoln Ave., Chicago, Ill.

The machine is designed to house and drive ½-m x 100 ft. of flexible steel shafting. The flexible rod

automatically coils and uncoils as it is fed into and from the container. The driving mechanism is a motor-driven head which is removable from the stand. In operation, this driving unit is held at the opening of the pipe or tube so that the desired length of flexible rod may be fed into the pipe.

Cutter heads of various sizes are elliptical shaped, spring steel. The normal speed of these cutter heads is 300 rpm., and the flexible shafting rotates the cutter head through

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DIAPHRAGM PUMPS
Hand Sizes 2", 2½", 3", 4"
Power Sizes 3" and 4"
Open Discharge or Force Pump
Edson Special Suction Hose
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Main Office and Works: 49 D St. South Boston, Mass.
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..for ACCURACY and TROUBLE-FREE OPERATION
INSIST ON THE WILSON HYPO-CHLORINATOR
Engineered and Manufactured by
WILSON
CHEMICAL FEEDERS, INC.
203 CLINTON STREET BUFFALO 4, N. Y.

ZECO GREENSAND ZEOLITE
ZECO and HI-ZECO Greensand Zeolite for water softening, filtration and iron removal. ZECO Manganese Zeolite for iron and manganese removal. COREXITE mineral for corrosion control and water stabilization.
ZEOLITE CHEMICAL CO.
Sales Office 141 Centre St. New York N. Y. Factory Malden N. Y.
Pioneer Producer of GREENSAND ZEOLITE MINERAL

the line regardless of the number of turns and bends. Devices like this have been used to clean sludge lines as well as house sewer lines.

## LITERATURE AND CATALOGS

**Modern pH and Chlorine Control** by W. A. Taylor & Co., 7300 York Road, Baltimore 4, Md. is more than just a catalog of chlorine control equipment; it is a treatise on the subject of chlorination control as well. Contained in this 87 page pocket sized edition are discussions of the meaning of pH control, methods of pH and chlorine control, the pH of various indicators and solutions, applications of pH and chlorine control in a large number of industries, precautions to be observed in determining pH, and the theory of electrolytic dissociation. Less than half the book is devoted to cuts and description of Taylor pH control equipment, but you'll find any type of equipment


GOLDEN-ANDERSON

*Design and Build*

OVER 1500

TYPES AND SIZES IN

AUTOMATIC

VALVES

For Engineered Protection

on any HIGH PRESSURE

INSTALLATION

● Make Golden-Anderson Valves your first choice on any new or replacement project—for maximum safety, dependability and protection.

*Descriptive Technical Catalog on request*

GOLDEN-ANDERSON Valve Specialty Company

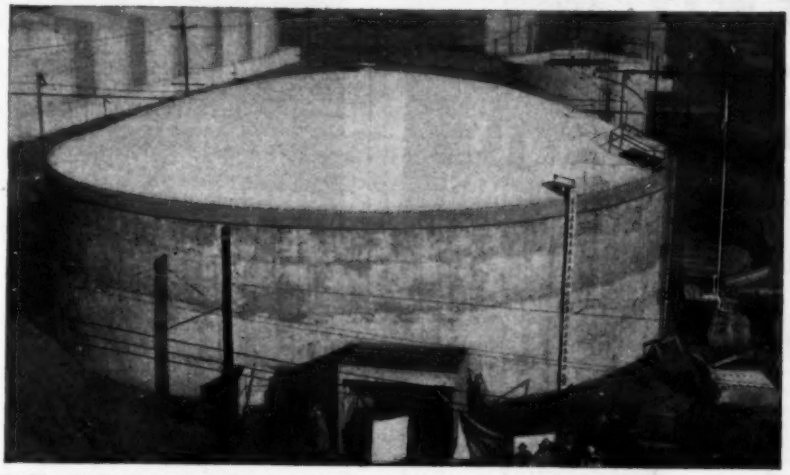
FULTON BUILDING • PITTSBURGH 22, PA.



CEMENT GUN COMPANY

"GUNITE" CONTRACTORS

GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.



PRE-STRESSED "GUNITE" WATER TANK

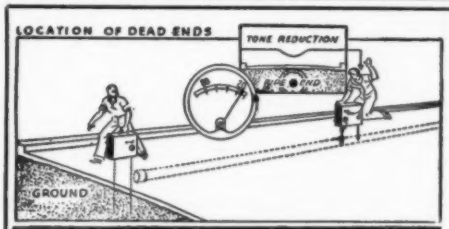
The water storage tank shown above was built by us of "GUNITE" in 1944. The wall and dome ring girder are pre-stressed. The dome roof is also "GUNITE." It is 90′ in diameter and 25′ deep, and is bottle tight.

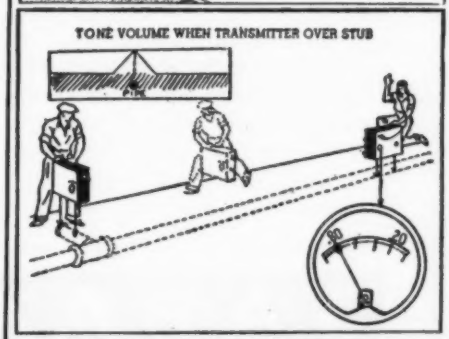
We have built scores of similar pre-stressed tanks and stand-pipes for the storage of various liquids, and also pre-stressed silo for the dry storage of chemicals.

Our new bulletin C2300 describes this work and a great many other jobs. Write for your free copy today.

MANUFACTURERS OF THE "CEMENT GUN"






M-SCOPE

Buried Pipe Finder and Leak Detector

FREE 16 PAGE BOOKLET UPON REQUEST

The M-SCOPE consists of a specially designed radio Transmitter and Receiver, with conductive wire. In operation, the Transmitter sends out a continuous signal, and when there is no metal between Transmitter and Receiver, a definite volume of sound is heard in the Receiver earphones and the meter (mounted on Receiver) gives a definite reading. If a metal object lies between the two units, sound in earphones is louder and meter reading higher—and the pipe or other metal object is located.

*The M-SCOPE is solving — successfully — the varied problems involved in the development, operation and maintenance of buried pipe and cable systems and is in daily use by representative organizations in such important groups as:*

- Government Projects
- Municipalities
- Sewerage and Water Plants
- Consulting Engineers
- Airports
- Public Utilities
- Industrial Plants
- Oil and Pipeline Companies

*Write for further particulars and booklet:*

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*Direct Teletype* PALO ALTO, CALIFORNIA

EDDY
FIRE HYDRANTS AND VALVES
WATER WORKS EQUIPMENT

EDDY VALVES
For
Water Works
and
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Plants

EDDY FIRE HYDRANTS
For Fire Protection Service

*Write for Complete Catalog*

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VALVE COMPANY
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ANTHRAFILT
*A Filter Medium For All Purposes*

ANTHRACITE EQUIPMENT CORP.
101 Park Ave. New York

C. E. PALMER
Engineer and Sales Representative
822 E. 8th STREET. ERIE, PA.

you may desire. Yes, this book is more than just a catalog; it is a textbook that belongs in your library.

* * *

Here's a big book worth $1.75. Measuring 8½ x 11 inches and containing 372 pages on excellent paper, **"How to Maintain Electric Equipment in Industry"** is a book intended to help industrial plants get the most out of electric equipment.

According to the foreword, "every attempt has been made to make this book easy to refer to and easy to use . . . nearly every section opens with a *preventive-maintenance schedule* and closes with a *trouble-shooting chart.*"

Marginal headings make it easy to find the information you want, and there's room for making your own marginal notes. The sections in the book cover electrical equipment from Battery Trucks to Welders and include Bushings, Cable and Wire, Industrial Control, Instruments, Insulation, Heaters, Turbines, and ten other items.

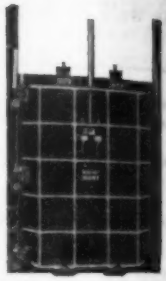
There is also a ten page section on technical data, including the treatment for electrical shock, four

TAPAX
*The ORIGINAL and FINEST....*

Manhole Cushion U. S. Pat. No. 2,050,050 offers you the simplest solution for noisy, rattling covers. Easy to install. Lasting — Economical.
Write for story of Tapax and Trial Offer.

TAPAX MFG. CO., INC.
MAMARONECK NEW YORK

RODNEY HUNT



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Metal or timber sluice gates of all sizes and designs, approved by engineers everywhere. Improved gate stands and hoists for hand or motor operation. Also flap and mud valves, shear and filler gates, trash racks and rakes. Dependable canal equipment from dam to tail-race since 1840.

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118 Lake St., Orange, Mass., U. S. A.

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VOGT BROTHERS MFG. CO. Incorporated LOUISVILLE KY.
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AERO-MIX

AERATOR—MIXER

A Size and Type to Fit Your Problem in Water or Sewage Treatment.

WRITE FOR INFORMATION

pages of renewal parts, and a complete index. Write to the General Electric Co., Schenectady, and enclose a check or money order for $1.75. You'll find it's money well spent.

* * *

We're awfully sorry but the supply of copies of **Allis-Chalmers Annual Review** for 1944 is too limited. Too limited, that is, for it to be offered to any reader who might want to see a copy. It's too bad that this is so, for this 1944 issue certainly contains a lot of interesting information—and pictures, of the products of Allis-Chalmers and where those products are seeing service.

The book is divided into seven sections, Power Generation, Power Distribution, Processing, General Industrial, Construction and Agriculture, Transportation, Marine, and Research.

Maybe you don't have a steam, gas, or hydraulic turbine, and maybe you don't mine coal, or produce rocks, cement, or oil, but we'll venture you do use unit substations, switchgear, and transformers, texrope drives, motors and controls, and centrifugal pumps. And we'll further venture to say you'd be interested in almost the whole 80 pages. Maybe with the war over, the Allis-Chalmers Co. will be able to issue more copies next year. We think they should make this book more generally available.

* * *

Under the title of "Clean Shave," the **Westinghouse Newsfront** tells the story of the newest method of removing bark from logs. The method consists of directing powerful jets of water under 900 to 1400


LEADITE

The Pioneer Self-Caulking Material for C. I. Pipe

40 YEARS PROVE IT!

• Tested and used by engineers, water works men and contractors for more than 40 years. LEADITE has proved its dependability under most every condition of water main construction . . . proved that it makes a good tight lasting joint that improves with age.

THE LEADITE COMPANY
Girard Trust Co. Bldg., Philadelphia, Pa.

No Caulking

ODOR and TASTE are health factors too . . .

The WATER SUPPLY that pleases nose and palate is an important contribution to community health — people drink more of it.

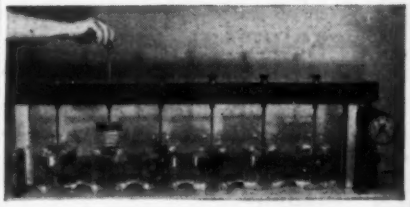
ESOTOO* is the answer to a simple, sure, and more economical method of controlling residual chlorine — especially in "break-point" chlorination.

ESOTOO* is the Ideal De-Chlorinator.

*ESOTOO is "Virginia's" Trade Name for Liquid Sulfur Dioxide.

VIRGINIA SMELTING COMPANY
WEST NORFOLK, VIRGINIA

THE Phipps & Bird LABORATORY MIXER . . .



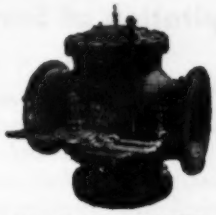
IS the important piece of equipment in the Modern Water Works Laboratory. Now being used by leaders in water works research. Many superintendents and chemists have been able to reduce their chemical costs by the control of chemical dosages with this mixer. Write for literature.

PHIPPS & BIRD, INC. Richmond, Va.

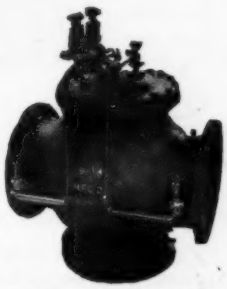
· 1879 ·
ROSS
AUTOMATIC VALVES

ALTITUDE VALVES • SURGE • RELIEF • BACK PRESSURE VALVES

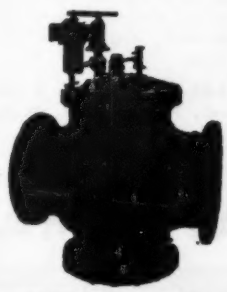
FLOAT VALVES • REDUCING AND REGULATING VALVES



ALTITUDE VALVES
for
Control of elevation and heads into and out of tanks, basins and reservoirs, hydraulic control.
1. Single acting.
2. Double acting.
3. Combination assembly for three or more automatic operations.
4. Can be equipped with electric and manual controls.



COMBINATION VALVE
This valve will permit flow in one or both directions acting as
1. Pressure Reducing and Relief Valve.
2. Pressure Reducing and Altitude Valve.
3. Relief and Altitude Valve.



REMOTE CONTROL VALVE
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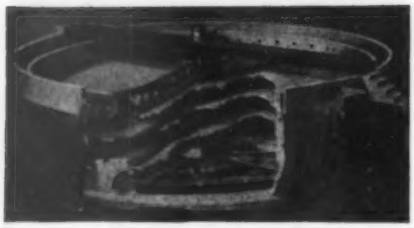

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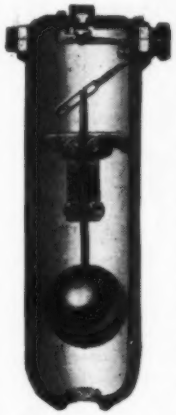

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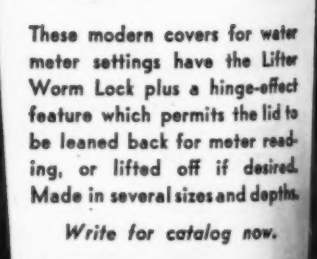

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* * *

We looked twice at the July-August issue of the **Yeomans Guard** when we saw an article therein on the sewage pumping station at Barranquilla, Columbia. The article shows the Avenida Olaya Herrara lift station with three pumps designed to handle a flow of 1.36 mgd. This station is typical of many that may be expected in South America in the future.

* * *

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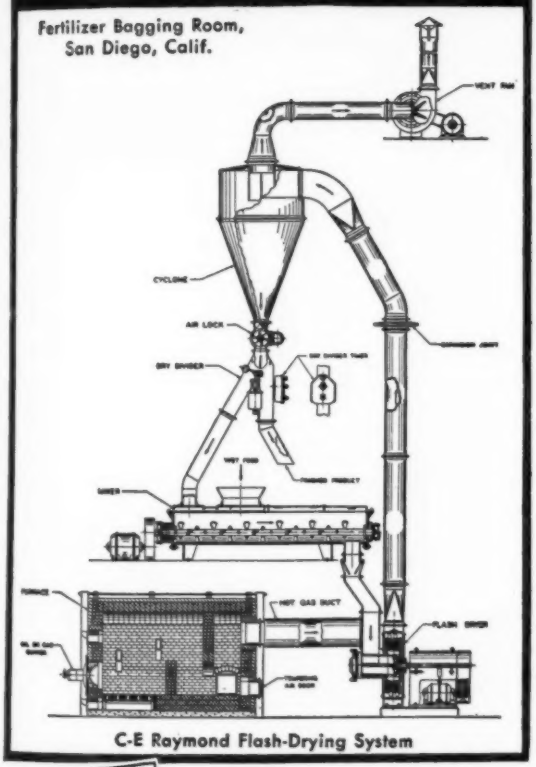

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Adaptability to changing community requirements has proved the flexible C-E Raymond System to be the right answer to sludge disposal problems in cities, with populations ranging from 5,000 to 3,500,000. This System produces a quality fertilizer for use in parks, or for ready sale at a profit—or converts sludge into an odorless, granular ash, for easy disposal or for use as fill.

**OFFERS EXCLUSIVE FEATURES**—The C-E Raymond System is the only complete method of sewage sludge disposal that produces a non-moulding dry sludge from high-moisture filter cake without nuisance, odors, scorching, or loss of valuable fertilizer ingredients.

**THERE'S A MARKET FOR *FERTILIZER***—Sewage sludge contains an abundance of the mineral elements necessary for plant growth (some sludges contain as many as 29 different elements). Actual tests show that plants fertilized with sludge had two to three times the root growth of plants grown under identical conditions using commercial 4-12-4 fertilizers. Measured by purely *chemical analyses* sewage sludge is not as high as commercial fertilizers in nitrogen, phosphoric acid and potash content but, because of its wealth of additional elements, many commercial fertilizer companies use sewage sludge as a base and fortify it with other elements to gain the analysis desired. One mid-western city reports that every bit of its sludge dried has been sold for fertilizer; in fact, *at least 250 more tons could have been sold if it had been available.*

**ASH—WITHOUT NUISANCE TO COMMUNITY**—At times when there is no profitable market for the fertilizer, the C-E Raymond System can be used to incinerate the sludge, leaving only a fine ash, free of unburned organic materials. The stack gases can be freely vented into the atmosphere with perfect assurance of no nuisance to the community.

C-E Raymond Systems now demonstrating their economical efficiency are drying or incinerating over a million tons of sewage sludge filter-cake annually.

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*For information on what the System can do, write for Bulletin No. 6791. Address inquiries to the nearest office of the Dorr Company, world sales representatives for the C-E Raymond System in the Sanitary Engineering field.*

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RESEARCH ENGINEERING EQUIPMENT

ADDRESS ALL INQUIRIES TO OUR NEAREST OFFICE

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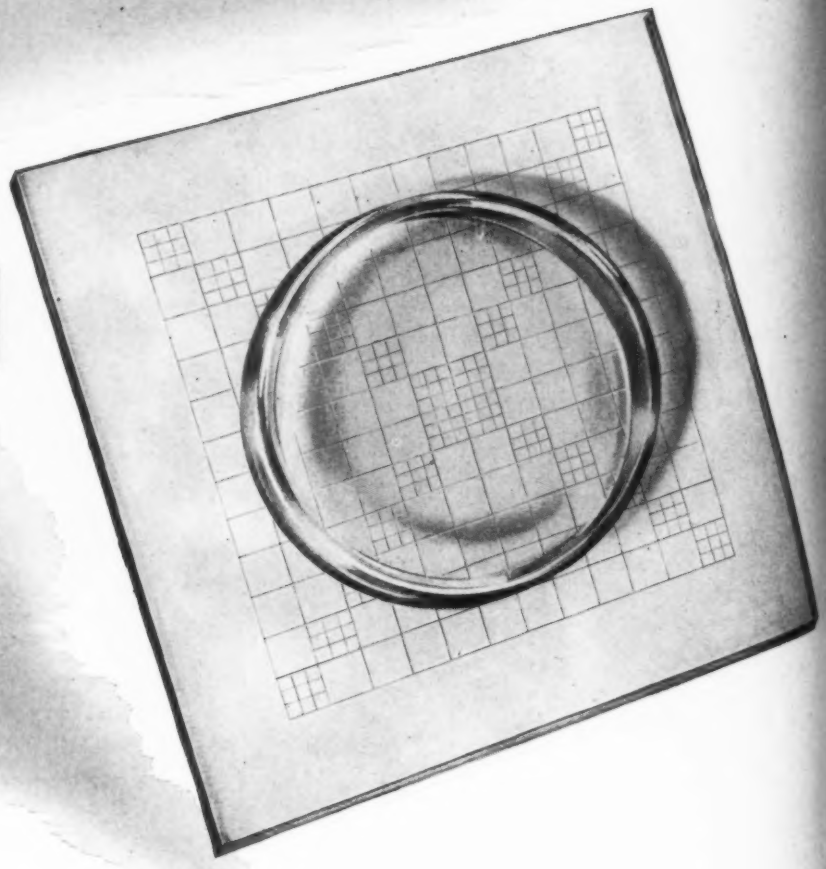
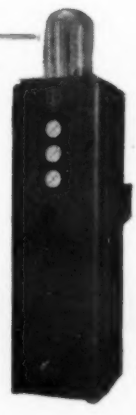
# A CLEAN BILL OF HEALTH



Progressive waterworks from coast to coast can now show a "clean bill of health" not only at the plant but throughout the system with the aid of the industry's new criterion of safety — *free available chlorine residuals.*

And Break-Point Chlorination — a development of Wallace & Tiernan research brought to practical application by W&T's nationwide field service organization — is the one sure way to maintain these residuals.

For further details on the role of *free available chlorine residuals* in your plant call on your Wallace & Tiernan Representative and *write* for a copy of "Bacteriological Improvements Obtained by the Practice of Break-Point Chlorination."



**WALLACE & TIERNAN COMPANY, INC.**

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